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ABSTRACT

The Networked Classroom was implemented by the Southern Interior Telecommunications Project (SITP) to provide computer mediated communication (CMC) to teachers and students in the southern region of British Columbia. The Networked Classroom uses telecommunication networks to link teachers and students from different locations, to support their access to information and information-sharing, and to facilitate collaboration and knowledge building. The technological infrastructure for this project is referred to as Computer-Mediated Communication (CMC), and includes computer conferencing, electronic mail, and online databases. Computer conferencing, a technology that supports group communication, was the principal medium used. Data for a formative evaluation were collected via archival search, questionnaires, interviews, videotapes of sessions, system-generated usage statistics, analysis of conference transcripts, and focus groups. This report provides an overview of Phase 1 of the project and its objectives, a description of the SITP resources, and the attributes of this new technology as perceived by project participants. It also contains information on participants' usage patterns, and an account of types of impacts this medium is having on SITP users and schools. The report concludes with research findings and recommendations to improve SITP in Phase 2. Appendices provide additional information, including descriptions of the research methodology used, the SITP conferences, and SITP approaches to online learning. (Contains 31 references.) (BBM)

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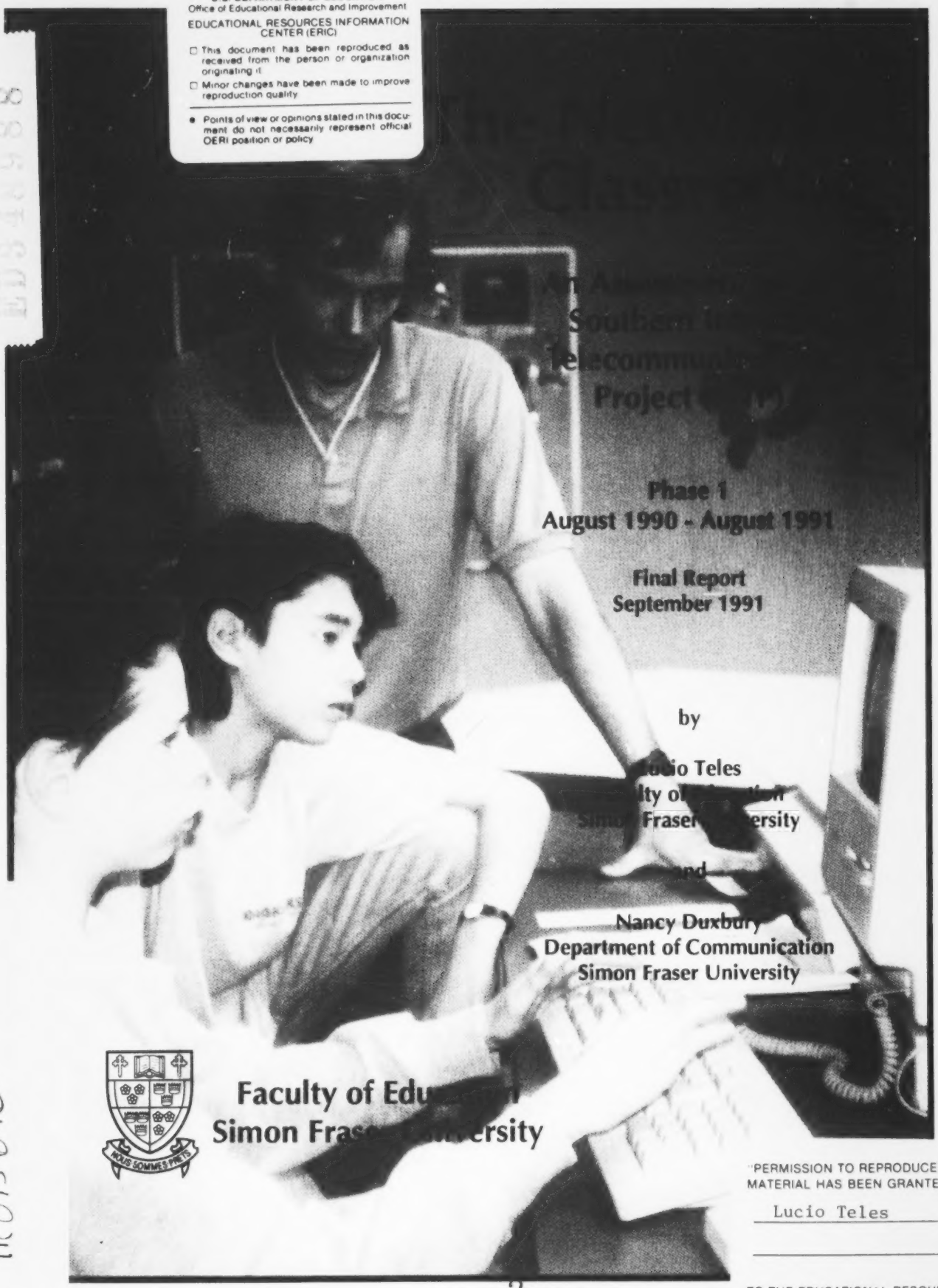

A Southern Telecommunications Project

Phase 1
August 1990 - August 1991

Final Report
September 1991

by

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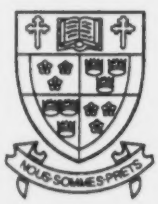

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Vancouver, September 1991.

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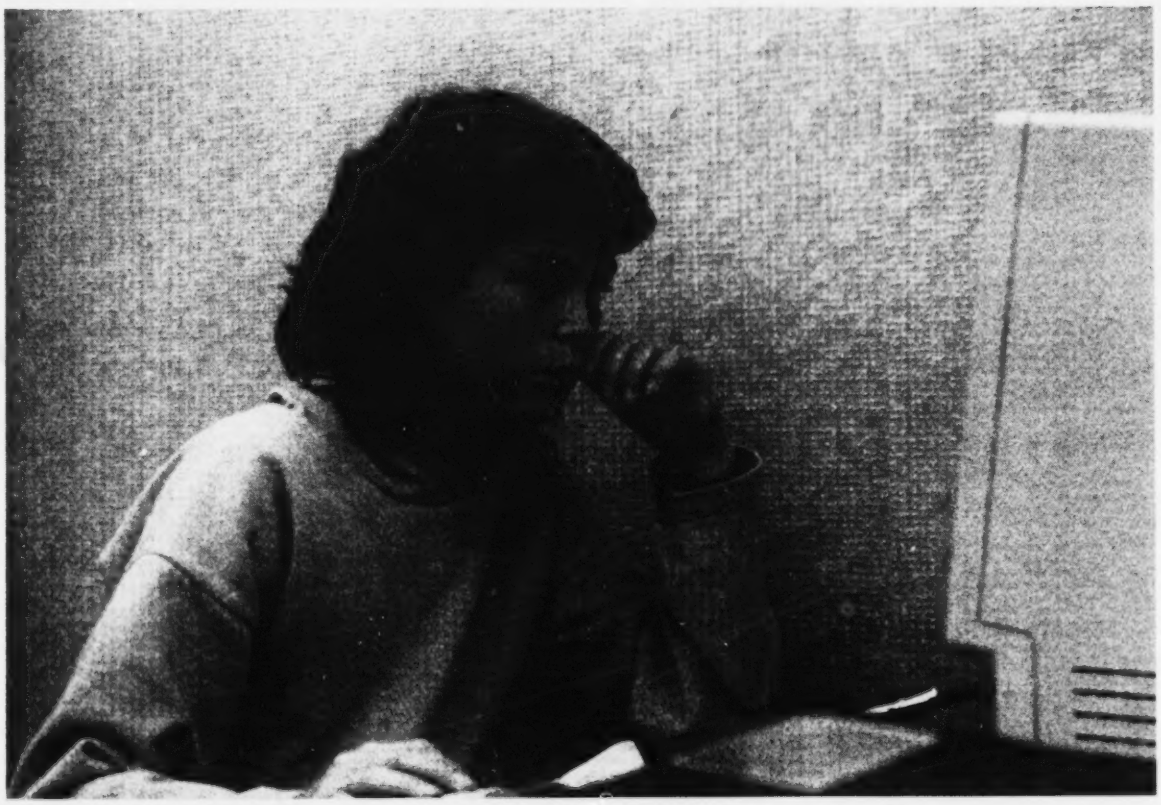


A student reads the response she received from the online moderator in the Ask-an-Expert conference.

Introduction

"SITP is one of the most exciting projects I have been involved with in 25 years of teaching. It reduces the dependency of students on teachers as sources of information and thus frees them to act independently." (A grade 12 teacher)

This report describes and assesses the Networked Classroom implemented by the Southern Interior Telecommunications Project (SITP). The Networked Classroom uses telecommunication networks to link teachers and students from different locations, to support their access to information and information-sharing, and to facilitate collaboration and knowledge-building. This study investigates how SITP teachers and students used new telecommunication technologies to create the Networked Classroom.

The technology that provides the infrastructure for the Networked Classroom is referred to as Computer-Mediated Communication (CMC), and includes computer conferencing, electronic mail, and online databases. Computer conferencing, a computer-based technology that supports group communication, was the principal medium used. In the CMC environment the learner builds knowledge through discussions, interactions, and collaborative work with online peers. The learner needs a computer, a modem, a telephone line, and access to online services that support communication activities. Through this shared environment learners form an "online community" that is not bound by geography but by common interest. CMC has no resemblance to most educational software that have built-in responses stored in the computer. In CMC the interactions are open-ended and generated by peers and experts on the network. Discussions take place asynchronously, i.e., not in real time, giving the learner the time to find other sources of information about the discussion topic, to reflect on the discussion, and to sharpen his/her ideas before entering a response or a comment. This time flexibility provides for autonomous learning as the learner can reflect, compare, evaluate, and finally elaborate his/her response.

SITP was established to provide CMC to teachers and students in the southern region of British Columbia. Phase 1 of the project encompassed 10 months, from September 1990 to June 1991 (See Appendix I "Overall Goals of SITP"). This evaluation report provides an overview of Phase 1 of the SITP project and its objectives, a description of the SITP resources, and the attributes of this new technology as perceived by project participants. It also contains information on participants' usage patterns, and an account of types of impacts this medium is having on SITP users and schools as shown in data collected in the project. The report concludes with research findings and recommendations to improve the SITP project in Phase 2, which begins in September, 1991. Several appendices are attached with detailed information, including descriptions of the research methodology used, the SITP conferences, and SITP approaches to online learning.

Various procedures were employed for data collection: archival search, questionnaires, interviews, videotapes of sessions, system-generated usage statistics, analysis of conference transcripts, and focus groups. Findings and final recommendations are based on systematic data collection, on extensive feedback received from SITP participants, and on a review of the literature on current CMC projects in education. These recommendations address issues critical to the success of the project.

Computer-mediated communication to support learning

One decade ago, educators considering the role of computers expected that the greatest use of this tool would be in the tradition of Skinner's "teaching machine," a tradition which included Pressey's multiple-choice test apparatus, developed in the 1950s, and programmed instruction of the drill-and-practice or problem-solving type. Skinner stated that these machines have a clear advantage over other teaching methods because reinforcement for the correct answer is immediate (Skinner, 1968). Computers in education were thus originally seen as tools by which students could learn on an individualized basis, using Computer-Assisted Instruction (CAI) programs. In CAI applications the user learns a given topic, i.e. multiplication tables through access to knowledge built-in and stored in computer's hard disk. The student accesses that information and through exercises and problem solving s/he can complete a learning module on multiplication tables. In Computer-Mediated Communication (CMC) mode the learning process is different: students do not access knowledge built in the computer. They access real people at the other end of the line or online databases. The focus of this review is therefore on the use of computers as communication tools and does not include CAI or other instructional modes of computing.

Computer-mediated communication, the use of computer technology to link individuals located in different places via computer networks, has been adopted by corporations and government agencies as a way to facilitate access to information and to enhance organizational communication. In the 1980's computer-mediated communication was introduced in higher education to deliver online courses (Harasim, 1990; Hiltz, 1990). Primary and secondary schools have also begun to use this technology to support learning networks and information sharing (Levin, 1990; Riel, 1989; Stout, 1989; Teles, 1991).

The adoption of computer telecommunications, however, is not a straightforward process. As with any innovation, side effects must be monitored and long term planning is required. For example, insufficient equipment, delayed start ups, and high turnover of personnel were identified as significant problems in the Electric Pages Project, ultimately negatively impacting the implementation (Stout, 1989).

The design of the online environment is a key issue. Online instructors need to design the educational activities and learners need to know in detail what they are expected to do online (Fredman, 1989; Harasim, 1990; Riel, 1990; Rogers, 1989; Teles, 1991). Telecommun-ications access software should be simple and easy to use. Teachers with 24 hour/day access to the system are more likely to make the best use of the technology (Resta, 1989). Timeline considerations must be taken into account: short projects with well-defined end-points have been successful (Fredman, 1989).

Research in CMC is a recent area of inquiry. Harasim (1990) defines CMC as a new learning domain, distinct from but related to face-to-face and from distant education models. In this domain, new learning environments have to be crafted, that is, designed and moderated to facilitate online interaction (Harasim, 1991).

Hypertextual transcript analysis can be beneficial to understand online interaction (Harasim, 1991). Brookshire (1991) discusses research in CMC as a teaching tool and categorizes research topics on class interaction, teacher-student interaction, course management (or classroom management models), quality of student performance, and student evaluation of instruction. Riel (1991) discusses three approaches to network analysis: the structural design of networks, the functions of network interaction, and educational outcomes for teachers and students.

Currently there are several educational computer networks in North America (Kurshan, 1990) and in the world. These networks use a variety of models to support online learning.

The specific educational use of CMC by the SITP project shares many similarities with other CMC projects as found in a review of the literature. There are also, however, many unique and innovative aspects of the project. The existence of various online experts (Legal Beagles, Dr. Spider, Bearman, others) is an important innovation to educational CMC.

The closest model to the SITP encountered in the literature is the AT&T Learning Network. The SITP model, however, is distinguished from the AT&T by its emphasis on input from participating teachers in the design and implementation of online activities.

While many projects have used CMC technology over the last ten years, there is a critical lack of information regarding the most appropriate models for telecommunications in schools and the impact of the technology on teachers and students. The studies cited above discuss implementation or process issues but do not provide models to systematically assess and identify factors affecting the success of CMC projects. This report introduces a model for conducting such an evaluation.

Students search an online database for their class project.

What is the Southern Interior Telecommunications Project?

Early in 1989 eleven school districts in B.C.'s southern interior expressed interest in initiating a pilot project dealing with the use of telecommunications in schools. A preliminary proposal was developed in the summer of 1989 by Ev Surgenor, Superintendent of Schools for Revelstoke, in collaboration with Dr. Milton McClaren of Simon Fraser University. The objective was to improve the educational system in the southern interior of British Columbia as teachers and students in this region are in need of more resources to support the teaching/learning process and the appropriate use of online resources has been shown to improve learning (Harasim, 1990; Hiltz, 1990; Riel, 1991; Teles, 1991). The Education Technology Centre of British Columbia (ETC) was approached with the proposal in August 1989.

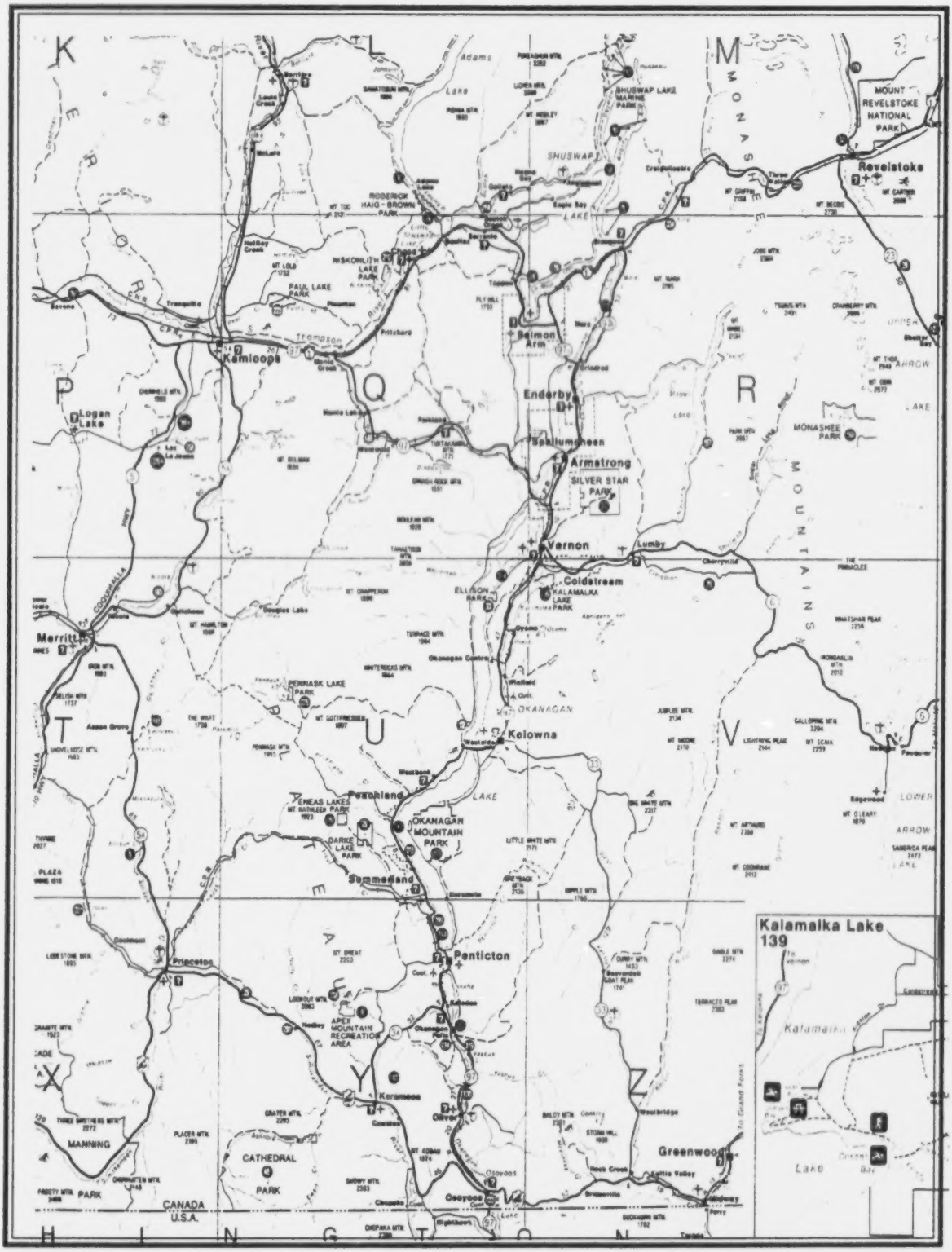
In the late fall of 1989, ETC initiated a feasibility study that reviewed district needs and aspirations. The study, which was undertaken by Teleconsult Ltd. of Vancouver, presented a conceptual design for a pilot project, along with a proposed implementation strategy.

During the winter and spring of 1990, a project plan was developed by ETC, and was discussed and ratified by school districts. Various online services were to be made available to teachers and students: online databases, electronic mail, and computer conferencing. Several online mentors and moderators were to be hired to provide assistance to students/teachers. Students could logon to access experts on particular curriculum areas, share information, and establish connections with peers in other cities, provinces, and countries.

A consortium made up of the eleven school districts, ETC, Simon Fraser University, and the Ministry of Education was formed. Participating districts are South Okanagan, Kettle Valley, Penticton, Princeton, Revelstoke, Armstrong-Spallumcheen, Vernon, Central Okanagan, Kamloops, Summerland, and Shuswap (see Figure 1). In addition, corporate sponsors within the telecommunications and information systems industries include B.C. Tel, Digital Equipment Corporation, and B.C. Systems Corporation. The Education Technology Centre is responsible for project management.

The project was launched on August 31, 1990, at the Silver Star Resort in Vernon, with a seminar organized to provide training on the use of the technology and to discuss implementation strategies. A user identification (ID) and a password were provided to each participant. At that time SITP had 174 participants representing 47 schools (27 elementary and 20 secondary). Throughout Phase 1, teachers, librarians, and staff joined the project. By July 1991 the project had 359 IDs, representing 82 schools. Not all accounts were used during the first year, however, as some participants were unable to go online due to lack of appropriate hardware, software, or adequate training.

Figure 1: The SITP school districts of the Southern Interior



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The Networked Classroom: online learning models

The Networked Classroom is a recent innovation in education and is rapidly becoming an important tool in K-12 classes. While there is still little information on the use of this technology in schools, a review of the literature in the field documents CMC as increasingly adopted by teachers and students in North America and other regions in the world. British Columbia already has dozens of schools which have established links with schools elsewhere in Canada or the world with which to implement various learning projects.

The new approaches to teaching and learning using CMC have been called The Virtual Classroom (Hiltz, 1990), Learning Circles (Riel, 1990), Online Education (Harasim, 1990), and the Networked Classroom among others. Hiltz (forthcoming) defines this new learning environment:

> A Virtual Classroom (TM) is a teaching and learning environment located within a computer-mediated communication system... It is hard to describe it in words, because it is a complex set of ever-shifting states, rather than something you can capture with a still photograph. The subjective expectations and perspectives brought to it by the participants do as much to shape what happens in the Virtual Classroom as does the technology.

Hiltz's definition emphasizes two major aspects of this classroom: the technology (hardware and sofware), and the designed environment. While there are several types of software for computer-mediated communication the major issue of the Networked Classroom is the design and implementation of the learning environment.

There are different approaches to the implementation of the Networked Classroom. Most K-12 educational networks have relied heavily on experts (in curriculum development or in the technology) to design the online educational environments. The SITP approach to CMC introduces a new model to online learning: it relies on users, not experts, to design and implement online activities.

The SITP model to the Networked Classroom relies on teachers to elaborate project policy and design learning activities. This model is based on an interactive process, involving ongoing consultation between project staff and the participating teachers. Project management obtains users' input in several ways: online conferences, group messaging, visits to school sites, focus groups, and an evaluation design based on data collected from all participants. Project management also encourages participants to make concrete contributions such as designing and moderating conferences and provides them with the necessary support to implement their suggestions.

In the SITP model teachers are exposed to a variety of online services. Once they access the technology and know how to operate it, project management has assumed that participants will develop meaningful ways to use the available resources. Teachers are expected to develop curricular tasks to be implemented in the online environment. To facilitate this process and the online interaction moderators and mentors were hired to work with teachers and students.

Teachers have made contributions to various aspects of the project during Phase 1. They have suggested curriculum areas and have designed conferences which will be implemented during Phase 2 of the project (i.e., the conferences are Salmonids Online, Waste Management, SITP Writing, among others). These conferences are designed and moderated by participant teachers. SITP users have also made suggestions regarding the types of online resources to be made available for other teachers, ways to facilitate the introduction of CMC in other school districts, and the design of a user interface for educational activities.

Focus of the SITP Phase 1 evaluation

The major goal of Phase 1 of the SITP project was to introduce CMC into schools of the Southern Interior to support the educational process.* Districts had to obtain hardware and software, while teachers had to be trained on the systems, and get their students involved in the project. The focus of the evaluation was to study and assess the use of CMC to support the educational process of selected schools of the Southern Interior of British Columbia, to identify usage patterns and the most used online resources, and to investigate how these resources were used to support learning activities, the types of impacts the technology has on participants and schools, and the main obstacles to the successful use of CMC by participating schools.

To investigate the implementation of the Networked Classroom the following questions were researched:

(1) Who are the SITP participants (teachers, librarians, staff, principals) and which online services did they use in Phase 1?

(2) How did participants use computer-mediated communication to support educational activities?

(3) Does CMC impact school settings and participants? If so, how?

(4) What were the main obstacles to using CMC faced by participants during Phase 1?

(5) What is required in order to expand the CMC strategies of this project to other regions of the province?

The methodology used to investigate the evaluative questions was based on the assumption that learners in the Networked Classroom have a variety of experiences and data that should be collected from all participants at different moments of the implementation process. The extensive feedback from teachers allowed for the identification of the major issues affecting the implementation of the Networked Classroom and the establishment of a set of recommendations needed for policy direction.

This methodology was comprised of several stages of data collection and analysis (see Appendix II for more detailed information):

(1) preliminary and baseline data collection through two questionnaires to all participants (questionnaire 1, in August 1990, with 45 respondents, and questionnaire 2, in January 1991, with 75 respondents) and system-generated usage statistics;

(2) monitoring of project implementation and users' activity through interviews, conference transcripts, and system-generated usage statistics;

(3) identification of types of impacts on users and school settings through a third questionnaire (August 1991 with 62 respondents), conference transcripts and focus groups; and

(4) triangulation and expansion of findings through interview with selected participants, telephone interviews, focus groups, and questionnaire 3.

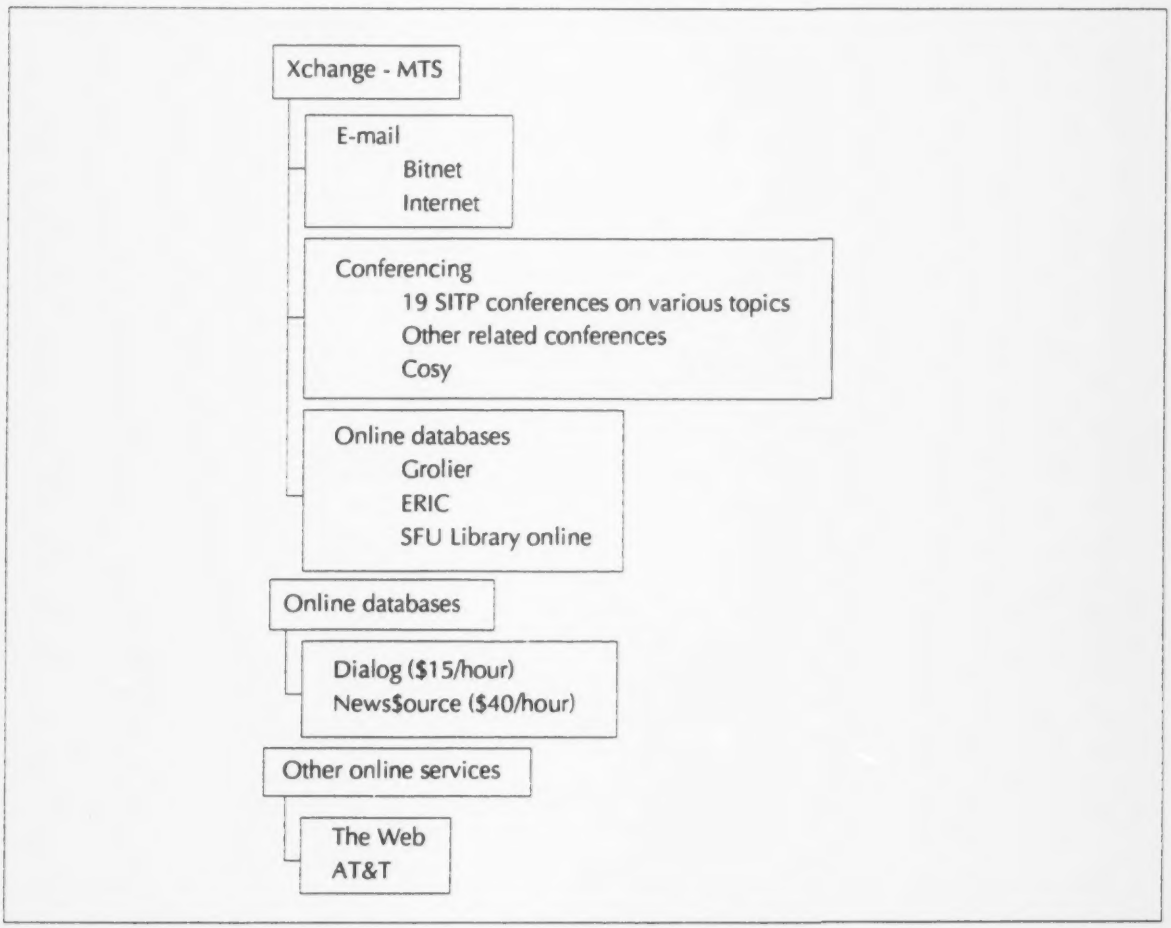
* The overall goals of SITP are outlined in Appendix I.

SITP online resources

SITP participants were given access to a number of online services: electronic mail (e-mail), computer conferences, and online databases. Online mentors and moderators were also available to participants. Two accounts were given to each district for: Dialog, News$ource, The Web, and AT&T Learning Circle. Figure 2 shows the SITP services available during Phase 1.

SITP participants used various conferencing systems, housed in institutions located throughout Canada and the U.S. These were: the *Forum conferencing system of the Xchange Program of the Faculty of Education, Simon Fraser University (this system is housed on the Michigan Terminal System (MTS); COSY, housed at Softwords which hosts the Computer Using Educators of British Columbia (CUE BC) conferences; and The Web (housed on a IGC software) which is an online service for non-profit organizations to discuss environmental, human rights, peace, and international development issues. In addition, the AT&T Learning Network was used by many SITP classes. Online databases such as Dialog and News$ource contributed to an information-rich learning environment. Project participants were able to access these resources through the INET network provided by B.C. Tel. Through an INET menu they accessed SFU's MTS system and the Web. Access to AT&T was done through Datapac.

Figure 2: SITP online resources



Who are the SITP participants?

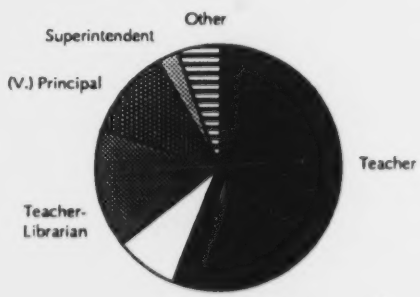
In Phase 1 IDs were given to individuals and to schools of the eleven school districts involved in the project. Individuals were given accounts in two ways: The original 174 participants were selected by principals and superintendents, who recommended names of teachers they believed might be interested in the project. Once other teachers heard about the project, many requested SITP IDs as well–more than 150 IDs were given this way. When the project reached 359 IDs, management decided to curtail membership because SITP is a pilot project and has limited resources to provide training and assistance to participants.

Schools were also given IDs to be used by any interested individual. It was not known, however, who used these accounts (i.e. which teachers, librarians, staff, principals, etc.). The identification of SITP users was done by checking a database of assigned IDs against online usage.

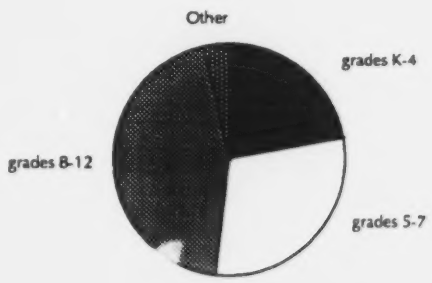
Figure 3 profiles some personal characteristics of SITP participants as recorded through questionnaires 1, 2, and 3.

Figure 3: Personal profile of SITP participants

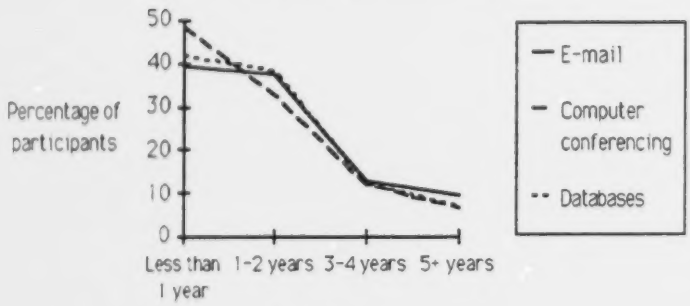
(A) Positions of SITP participants *



(B) Grades taught



(C) Experience with CMC
Data from questionnaire 3.



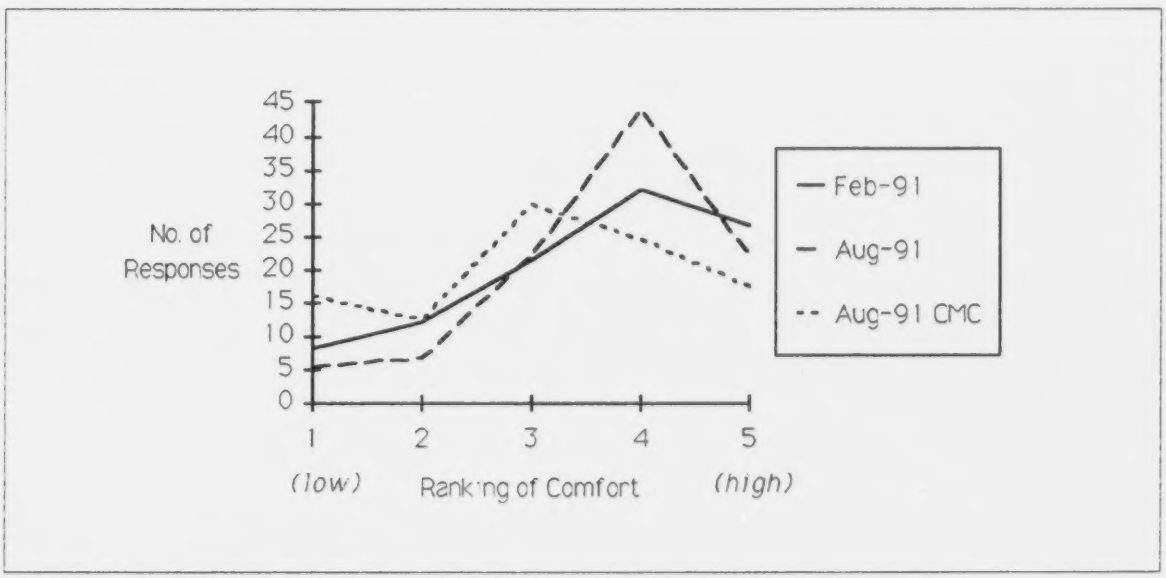
* This is how participants defined their positions. If all Librarians are classified as Teacher-Librarians, the proportion of Teacher-Librarians rises to 24 percent of SITP participants.

Comfort with Computers and CMC

Computers are often perceived by novice users as complex machines that are difficult to use and require a very long time to learn. SITP participants were asked about their comfort level with computers and CMC in January 1991 and August 1991. Figure 4 illustrates participants' responses.

Figure 4 shows that the majority of respondents felt comfortable with computers and with CMC by the end of Phase 1. This is not surprising, as most participants had some computer experience prior to SITP, and active participants gained both computer and CMC skills throughout the year. It also indicates that CMC is viable as an environment for teaching and learning activities for elementary and secondary schools.

Figure 4: Comfort with computers and CMC



Data from questionnaires 2 and 3.

The most used online resources

To track usage trends for each service accessible through MTS, usage statistics for each service accessible through MTS were collected through an SITP services menu installed on each SITP participant account (see Figure 5).

The date and time of day each participant logged in to a service, the service used, and the length of time spent online was automatically recorded. The total number of logons and total number of hours spent online by SITP participants accessing services through MTS between November 28, 1990 (when usage statistics were first collected) and June 30, 1991 are shown in Figures 6 and 7. "Session" indicates that the participant exited from the menu. While online time was tracked, it is not known what service was used.

While the total number of hours spent online provides an important measure of the amount of

Figure 5: SITP services menu

XChange Choice Description

1. Electronic Mail
2. Computer Conferencing
3. Access the Grolier Online encyclopedia
4. Access ERIC databases at UBC
5. Access Dialog
6. Access Project CUE
7. Change password/show info about account

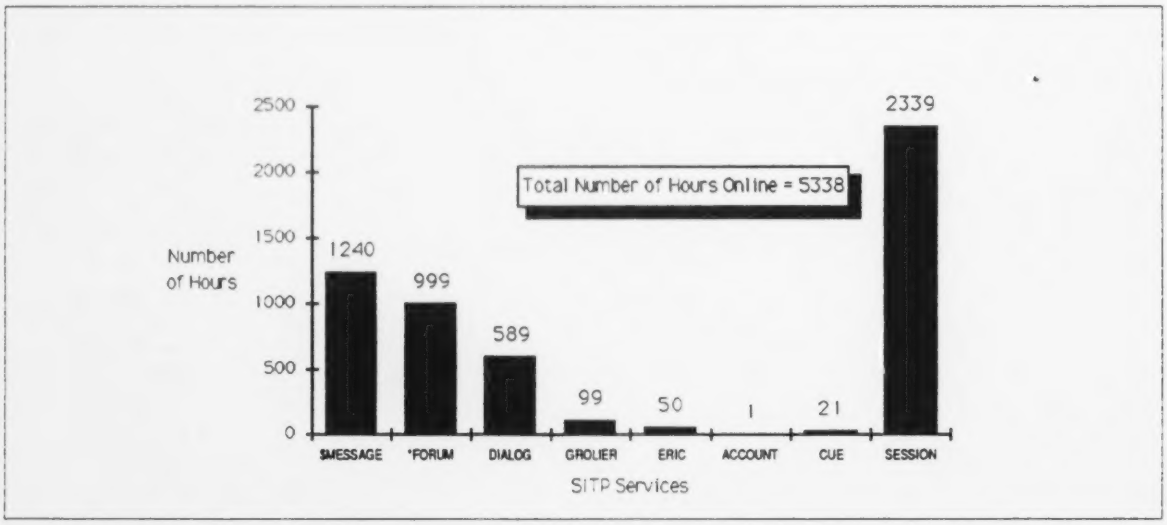
E Exit to MTS
S Sign off from computer

Enter a choice?

CMC usage, the number of logons provides information on how many times SITP participants used online services through the MTS system (see Figure 7).

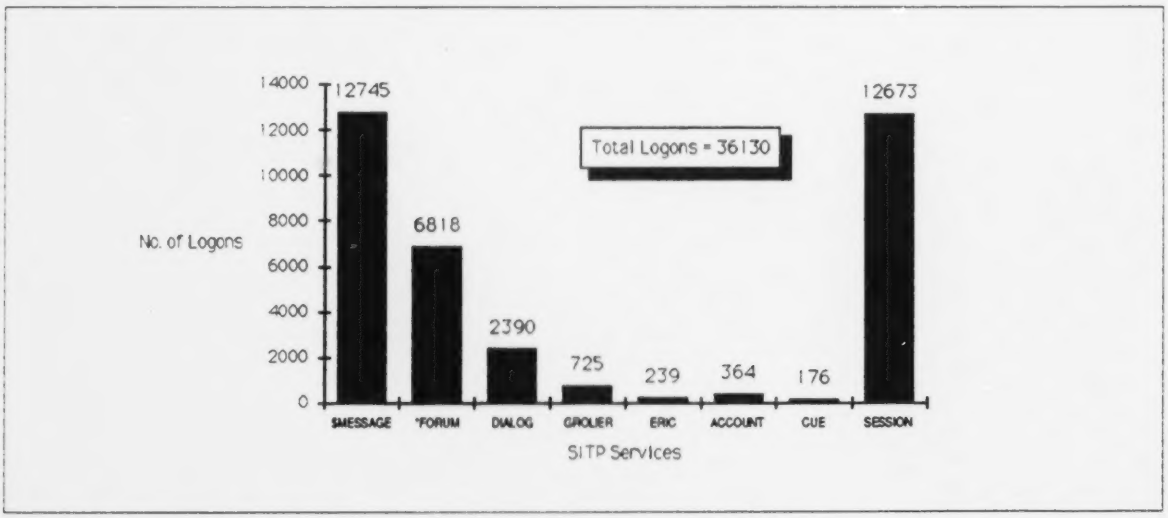
To check the usage of the SITP services in a more detailed manner, in August 1991 participants were asked to indicate their use of online services during Phase 1. These results are shown in Table 1.

Figure 6: Total number of hours on MTS (November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

Figure 7: Total number of logons to MTS-accessible services (November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

Table 1: Use of SITP services during Phase 1

Service	No. of responses	Percent of total respondents
E-mail	37	88.1
Dialog	29	69.0
Grolier	24	57.1
Ask-An-Expert *	22	52.4
Other computer conferences *	20	47.6
News$ource	18	42.9
Writing Conferences *	15	35.7
Eric	15	35.7
AT&T	13	31.0
Legal Beagles *	9	21.4
Other **	10	23.8

* These are some of the computer conferences.

** Includes Internet and Edutel, National Geographic, Web, and pen-pal communications with students.

Data from questionnaire 3.

E-mail: The most used service

The most used service during Phase 1 was electronic mail (e-mail). Electronic mail is a computer messaging system which supports one-to-one or one-to-many communication. E-mail is a useful tool for sending messages over distance or to busy individuals who can not be easily reached by phone. The MTS electronic mail system gave participants access to all MTS users as well as to addresses on Bitnet and Internet. One teacher commented:

"One of the neat things that I got out of this was the e-mail system. Two weeks ago, on Monday, I sent a dozen messages off asking for information on several items. By Friday I had returns from all but one, some of them the next day... I wish everybody in the world was on the system ... It's great—you send your messages to people and you get messages back the next day or very shortly afterwards, sometimes 10 minutes later. It's a fantastic way to communicate."

Data on usage patterns of electronic messaging was collected in two ways: (1) the number of participants who read a message sent out by the evaluation team was monitored and (2) computer-generated usage statistics were collected.

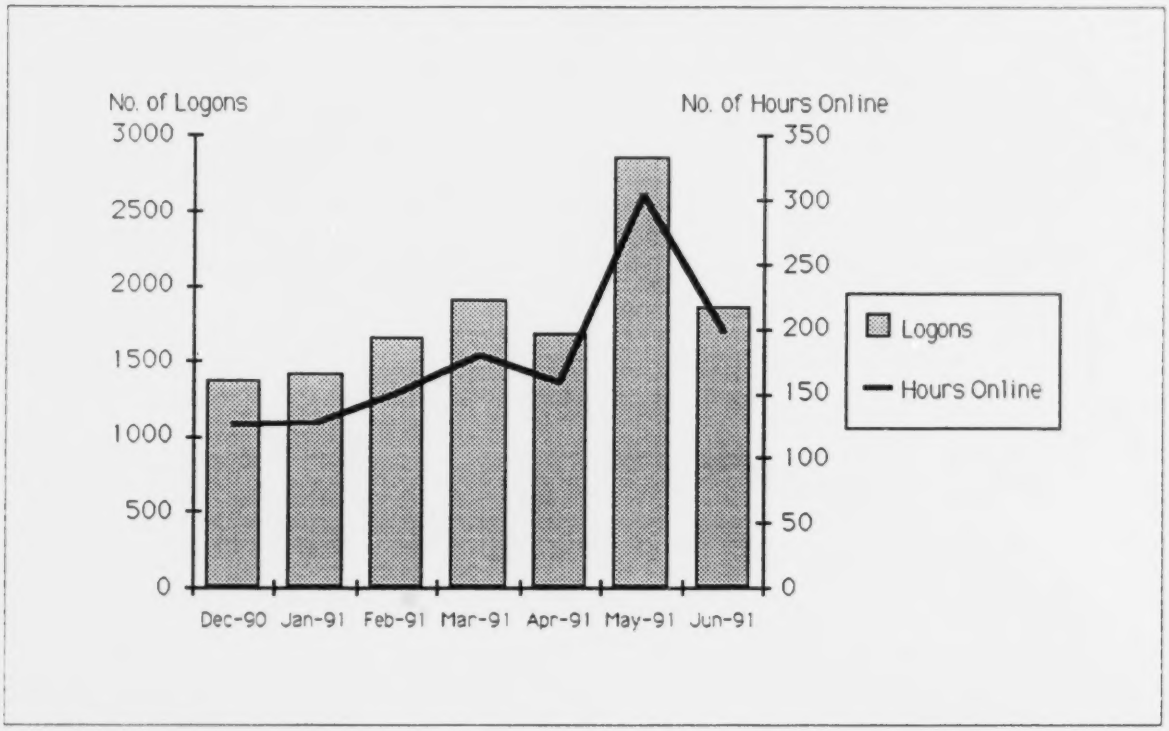
Monitoring e-mail readers

The MTS system allows the sender of a message to monitor the date and time each receiver reads the message. This feature was used to check who read messages sent by the evaluation team, and when they did so. A message was sent to all "SITP-Teachers" on February 11. When the reading of the message was monitored two weeks later (February 24), 89 persons had read the message (53 percent) while 78 had not (there was a total of 167 names on the mailing list). On March 1 (3 weeks later) it was checked again: 93 had read the message (55 percent) while 74 had not. Similar patterns of use were identified for prior e-mail messages.

Computer-generated usage statistics

The SITP Services menu tracked the number of times participants logged on to e-mail and the time participants spent online using email. The information gathered indicated that e-mail services were heavily used throughout Phase 1 (see Figure 8).

Figure 8: E-mail usage
(November 28, 1990 - June 30, 1991)

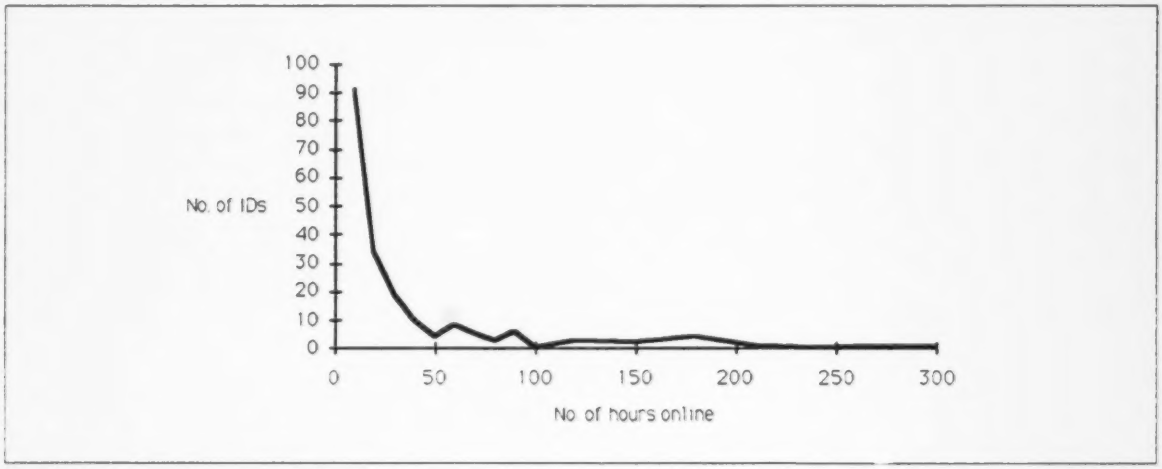


From data computer-generated on MTS.

* The increase in May is due to course online activities of the SITP teachers enrolled in the Masters degree "Telecommunications and the Curriculum" while taking the course *Research Methodologies in Education* (Edu 867).

Active and inactive IDs

Figure 9: Hours online to Xchange per ID (November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

The active and inactive participants

Of the total 359 IDs, 278 were given to teachers, librarians, principals and vice principals, district administrators, online moderators, mentors, and resource people, and SITP staff. The remaining 81 accounts were defined as school accounts and assigned to the general schools.

Not all IDs were actively used during Phase 1. Of the 359 IDs, only 192 IDs (53.5 percent) spent more than one hour online between November 28, 1990 (when usage was first tracked) and June 30, 1991. A further 56 IDs (15.6 percent) were online between 15 and 60 minutes during this time. This leaves 111 participants (30.9 percent) who used their account for less than 15 minutes.*

Active IDs

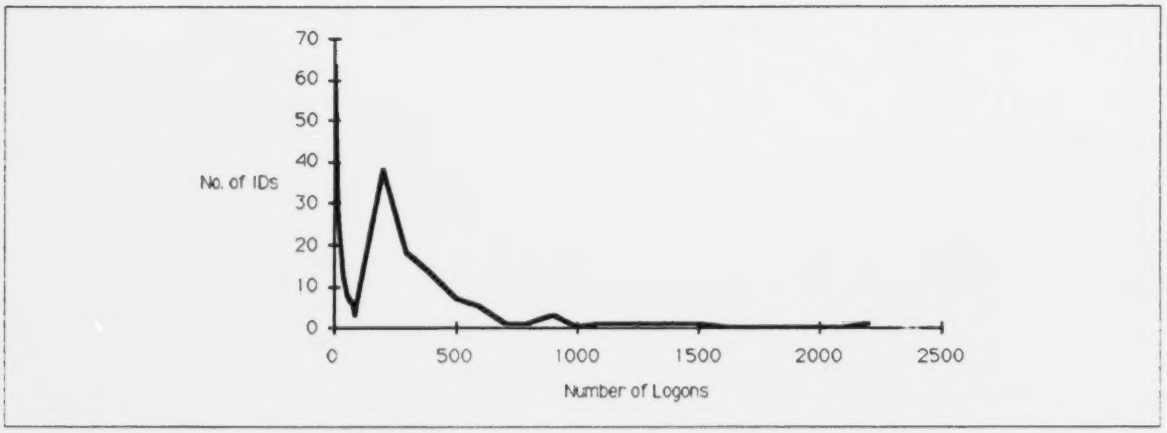
The active IDs (more than one hour online to MTS between November 28, 1990 and June 30, 1991) were identified through online data collection of the amount of time spent online and the number of logons per ID. Two limitations to this usage data were found. First, the usage statistics may not directly represent the use of one individual. An ID may have been used by more than one person, such as a teacher and his/her students. Second, some online time may have been spent on non-SITP activities. However, all online activity may be perceived as SITP-related because it will impact on the participants' use and attitude toward CMC.

Time online

Participants spent a total of 5,338 hours online using various MTS-accessible services between November 28, 1990 and June 30, 1991 (the online time for the AT&T Learning Network is not included). The time spent online per ID ranged from 0 to 297 hours. Although twelve participants spent over 100 hours online to MTS during this

* These statistics are based on usage tracked by the MTS system. One type of inaccuracy has been found for per-ID records: a few moderators and resource people have tracked at "zero usage" although they have been active because they used accounts assigned before SITP for which usage was not tracked and left their SITP accounts unused.

Figure 10: Number of logons to Xchange per ID
(November 28, 1990 - June 30, 1991)



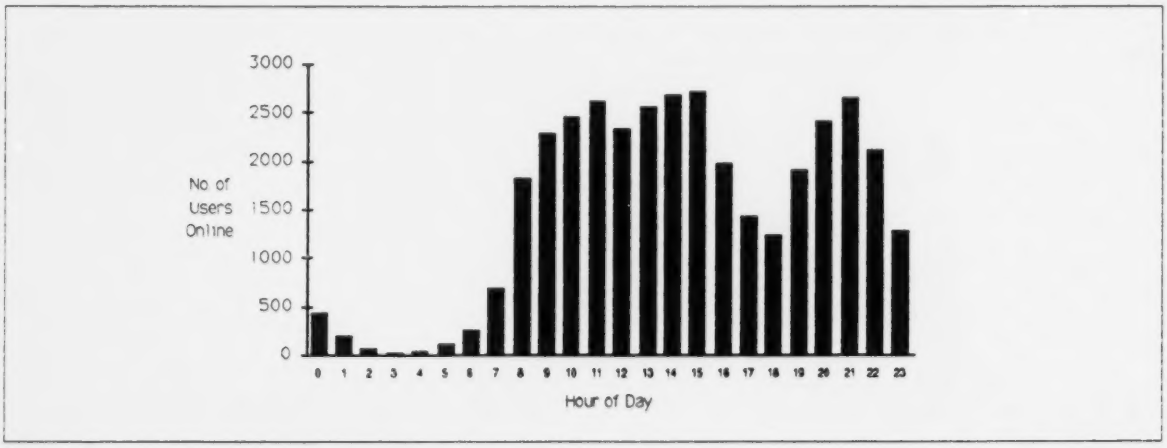
From data computer-generated on MTS.

time, 75 percent (144/192) of active participants spent between 1 and 30 hours online. Figure 9 shows the distribution of hours online per ID.

Logons to services*

A total of 36,130 logons were recorded between November 28, 1990, and June 30, 1991. There were 254 IDs (70.8 percent) with at least one logon recorded. Six IDs had over 1,000 logons recorded, with the most active participant (in terms of logons) having 2151 logons. However, most IDs were used less frequently: 52 percent (133/254) of IDs had between 1 and 50 logons, and 72 percent (184/254) had 150 logons or less. Figure 10 shows the distribution of logons per ID.

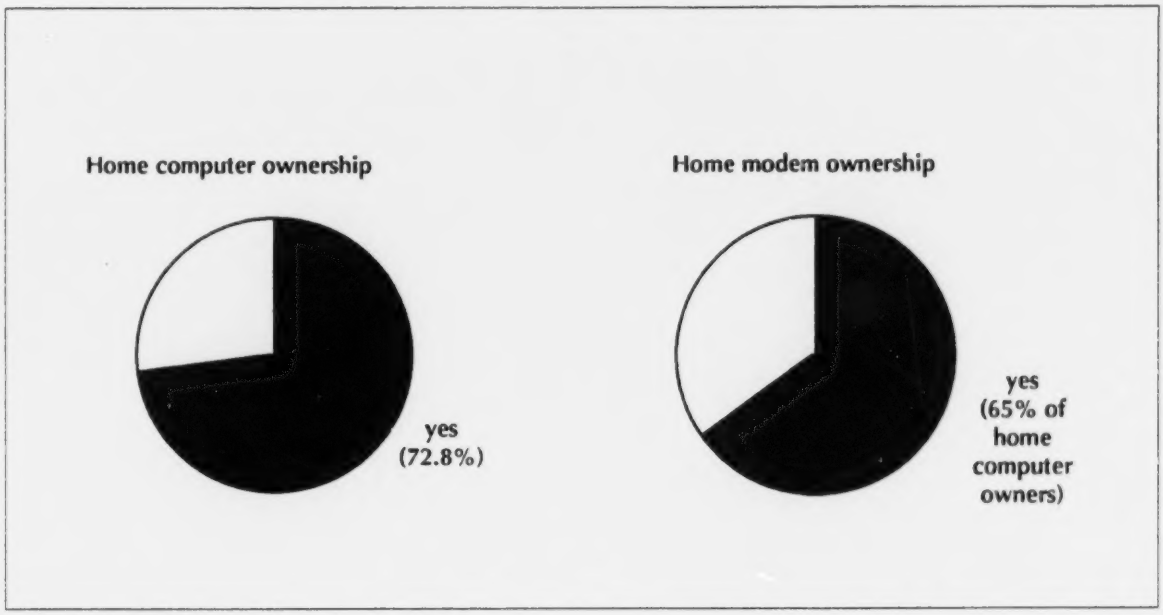
Figure 11: Xchange usage by hour of day
(November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

* A logon was recorded when a choice was made from the SITP Services Menu. Thus if a participant used three different services during one session, this was recorded as three logons.

Figure 12: Home computer and modem ownership



Data averaged from questionnaires 2 and 3.

Around the clock use

Participants signed on around the clock, with activity tracked during all hours. Peak use times were during school hours and in the evening. Figure 11 shows the time of day participants were logged on to MTS between November 28, 1990 and June 30, 1991. The high volume of telecommunications activity in the evenings shows the significance of owning a home computer and modem.

Results from questionnaires 2 and 3 indicate that approximately 47 percent of active SITP participants own a home computer with a modem. Figure 12 shows the average percentage of questionnaire 2 and 3 respondents who own a home computer and those who have a computer with a modem at home.

Inactive IDs

Seventy-six IDs with less than 10 minutes online time were identified on July 11, 1991.* Twenty-nine of these IDs had been given to schools and the remainder (47) had been assigned to teachers and administrators.

Thirty-nine of these 47 participants were phoned and asked why they had not used their IDs. The most frequent reply of participants reached was that they were very active but used a different ID.

*Originally, 81 IDs were identified. However, when these IDs were later checked against sorted per-ID usage stats, 2 were found to be active users and 3 to be doubled records. The adjusted total was 76 IDs.

Very few of those who responded experessed negative feelings about the project. Most were enthusiastic and very interested in getting involved during the coming school year. Table 2 shows the results of these phone calls.

Table 2: Reasons for not using SITP IDs

Reasons	Number of participants
Using a different ID	7
Late getting started (equipment was late arriving) but plan to use in fall	4
Lack of equipment	2
Lack of inservice but interested in getting involved	2
Too busy with regular class activities	2
Felt the project was for school use, not administrative use *	2
Didn't know they had an ID	1
Worked with AT&T in fall and Planning to use MTS services in fall	1
Uses extensively **	1
Total respondents	**22**
Not reached	17

* These two respondents were both District Superintendents. Neither could justify the time or the money required to connect their offices to the system. Both superintendents stressed that they felt the focus of the project should be for classroom use.

** See footnote on previous page.

Data from phone calls to non-active participants.

Using computer-mediated communication in Phase 1

Table 3: Expected and actual areas of telecommunications use

Areas of use	Expected use (August 1990)	Actual use (August 1991)
Exchange information with other teachers	91.1%	93.5%
Classroom activities	88.9%	93.5%
Administrative tasks	28.9%	12.9%

Data from questionnaires 1 and 3.

Participants were given access to the SITP services and received inservice training. SITP management assumed that teachers would explore the potentials of the technology and develop appropriate uses for it. During Phase 1, SITP teachers used CMC services extensively.

The participants' expected and actual uses of CMC were threefold: (1) to support professional development through exchanging information with other teachers, (2) to support classroom activities, and (3) for administrative tasks (see Table 3). The training SITP provided about telecommunications also contributed to the professional development of teachers.

Table 4: Expected teacher to teacher communication

Type of use	No. of mentions
Exchange plans, strategies and projects	12
Exchange ideas	10
Help, problem solving	6
Exchange information (students' or teachers')	5
Coordinate activities with others	3
Share experiences of others	2
Share issues of concern *	2

* For example: library automation, Intermediate Program implementation.

Data from questionnaire 1.

Exchanges between colleagues

Professional development and personal use of CMC included collegial communication and database use. In August 1990, participants indicated the activities and type of information they expected from networking with other teachers via CMC. Table 4 shows the seven categories of responses. Although the relative importance of these reasons changed slightly in real use, they were clearly some of the main purposes motivating colleagial communication via CMC during Phase 1 (see Table 5).

Many teachers reported that telecommunications is an ideal forum for sharing lesson plans so that they do not have to "reinvent the wheel" each class. CMC becomes especially valuable during times of curriculum change. Such online exchanges may encourage other teachers to become involved with this new technology since non-SITP participants can witness how the technology may improve their professional lives. Peer communication via CMC may develop as an extension of idea sharing and problem solving.

In August 1991, participants were asked to provide details of their own use of CMC and databases for professional development. The results are listed in Tables 5 and 6.

Teachers' database use went beyond just preparing for class. This indicates that the opportunities presented for database exploration and information retrieval also played a role in teachers' personal learning and professional development (see Table 6).

Table 5: Purposes for communicating with colleagues

Purposes	No. of responses	% of total responses
To ask for technical help	29	20.7
Coordinate activities with others	26	18.6
To offer help to another	18	12.9
To exchange teaching strategies and projects	15	10.7
Share experiences with CMC	14	10.0
Share general educational issues of concern	14	10.0
To share information gathered by students	10	7.1
To exchange lesson plans	8	5.7
Problem solving for teaching strategies	2	1.4
Others *	4	2.9
Total	140	100.0

* This included M.Ed. Program (3) and coordination of SITP Activities in Kamloops (1).

Data from questionnaire 3.

Table 6: Purposes for database searches

Purposes	No. of responses	% of total responses
For student projects	32	31.1
For personal interest	31	30.1
For class preparation	26	25.2
For community-related projects	4	3.9
Other reasons *	10	9.7
Total	103	100.0

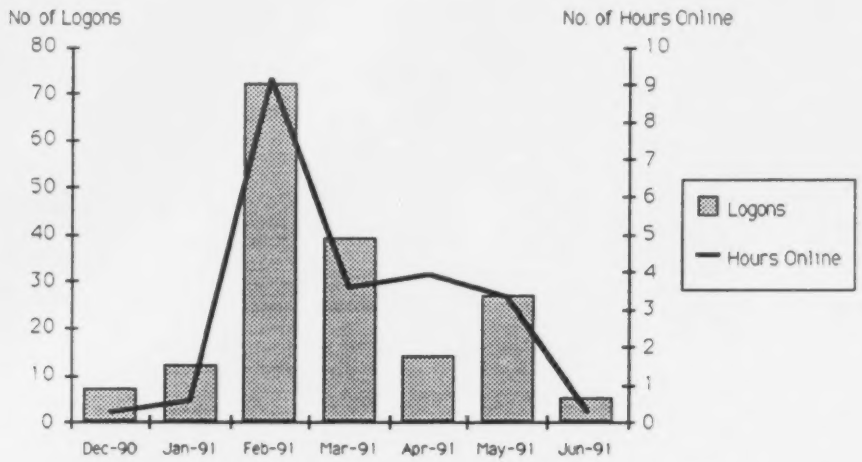
* These were: Practice/orientation/learning (3), Master's program work, (2) library research, educational professional development, demonstrations to parents, and extra-curricular debating championships (1 response each).

Data from questionnaire 3.

The high incidence of using CMC for technical assistance, as indicated in conference transcripts, also indicates the importance of access to the conferences operated by the Computer Using Educators of British Columbia (CUE BC). **CUE BC** operates a conferencing system housed in Victoria known as the Technical Information Exchange (TIX). Experts on the Mac, Apple, IBM, and other computers respond to questions posed by users in the province. TIX can be used by all teachers and is also accessible from the SFU Xchange system. Figure 13 shows the use of the CUE BC system by SITP participants.

The increase in February coincides with a newsletter sent out that month, which had an article focussing on TIX.

Figure 13: CUE BC usage
(November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

Bitnet

The academic network, Bitnet, was used for e-mail and to access online database archives on various topics. Bitnet is a computer network supported by a consortium of universities in various countries and by corporate partners. It provides communication services for electronic mail, file transfer, and online databases, among others. Through Bitnet hundreds of mailing lists and online archives can be accessed in different universities and research centres in the world, free of any charge for the end user.

Bitnet's mailing lists and online archives can be useful for various teacher and student activities. A good example is **Kidsnet**, a mailing list that is accessible by SITP members through Bitnet. Messages from this list were sorted and placed in a conference to facilitate access. Another valuable service is **Edutel**, "A Forum for Considering CMC Applications in Educational Contexts". In Comserve News (#36, Volume 5(3)), an electronic newsletter, the Edutel service is described:

> Since the networks themselves may be the best medium for discussion educational applications, a cross-disciplinary, cross-institutional group of scholars has joined forces to create and guide EduTel, an electronic conference whose purpose is to consider how computer-mediated communication can be used to achieve educational goals.
>
> Initially, EduTel staff will encourage discussion related to three broad educational themes. One theme will focus on how computer-mediated communication can enhance students' and faculty's educational experiences within and outside the classroom contexts.

At least 22 SITP teachers (students in the M.Ed. degree program) have joined this conference.

Teacher training for CMC: a professional development activity

A major aspect of the introduction of the Networked Classroom involves the training in the use of computer-mediated communication. Project management used several approaches to the provision of training:

- Workshops: Several workshops were provided to participants. The first training workshop was given at the Silver Star Resort, in August/ September of 1990 and lasted three days. Project participants were given IDs and were provided with extensive hands-on training on the use of CMC. Subsequently workshops were provided at the SFU TeleLearning Centre in Kelowna.

- Inservice training: The trainer of the SITP project (Enid Kristjanson) went to several schools of the project to provide inservice training to teachers, librarians, and staff.

- Telephone support: Users often experienced problems with logon and navigational procedures as well as various types of technical difficulties with their hardware. When these type of problems occurred they could call the SFU TeleLearning Centre. The trainer, Enid Kristjanson, would provide userhelp and information. Many problems, however, could not be solved through a telephone conversation and required a trip to the school.

- Online support: Participants could also obtain help through online messages. Some participants joined such conferences as IBM or Macintosh (these were conference titles) and would write a comment requesting help for an specific problem. All messages posted by participants received a response. The SITP had also its own discussion in the conference SITP.ETC to provide support to participants. Discusion "Technical Assistance" was moderated by Enid Kristjanson. Its introductory statement reads "This is the place to ask for technical assistance or to offer technical assistance to others in the project."

Despite the provision of these user supports, 42 percent of questionnaire 2 respondents reported that they still felt that more training and support was needed. The mastery of CMC by teachers requires substantial amounts and various forms of training. Once participants are familiar with the

technology and the techniques to navigate and work online, less support is needed.

In the classroom

A variety of online services were used by participants for classroom activities as reported by questionnnaire respondents (see Table 7).

While the table above table shows that database searches and the exchange of writing samples were activities used by the *majority* of respondents, it should be noted that the most *used* activities, according to system-generated usage statistics, were *e-mailing* and *computer conferencing*, as shown in Figures 6 and 7.

SITP conferences

The SFU *Forum system houses hundreds of conferences, many open to everyone. Topics vary from current political issues (conference Forum), to how to learn Spanish (conference Conversamos), or how to establish contact with users in other cities and countries (conference Telecom).

Nineteen SITP conferences were set up in *Forum to serve project participants. Four additional conferences—Wired.Writers, Write.With.You, Ask-An-Expert, and Law-Forum—were educational conferences open to all schools, not only those in the SITP project. Figure 14 shows the use of *Forum conferences by SITP participants.

Table 7: Classroom applications

Applications	No. of responses	% of total responses
Information searches of databases for research	39	26.7
Sending writing samples to other classes	21	14.4
Receiving writing samples from other classes	19	13.0
Asking questions to Environmental experts	14	9.6
AT&T Learning Circle projects	13	8.9
Pen-Pal exchanges	12	8.2
Asking questions to Legal Beagles	11	7.5
Student mentoring	6	4.1
SITP inter-school projects or information exchanges	5	3.4
Asking questions to others online (not Legal Beagles or Environmental Experts)	3	2.1
Other (National Geographic, e-mail exercises, and word processing)	3	2.1
Total	146	100.0

Data from questionnaire 3.

Most SITP conferences were curriculum-related and focussed on three areas: Writing, Environmental Studies, and Law. There were also conferences to discuss database use, i.e., Information Systems, developed for librarians and interested teachers; to discuss administrative uses of CMC, i.e., School Administration; and to discuss SITP related administrative activities, i.e., SITP.ETC. Table 8 lists the number of discussions, number of participants, and number of lines of messaging in each SITP conference between September 1, 1990 and August 31, 1991. (For a more detailed discussion of each conference see Appendix III).

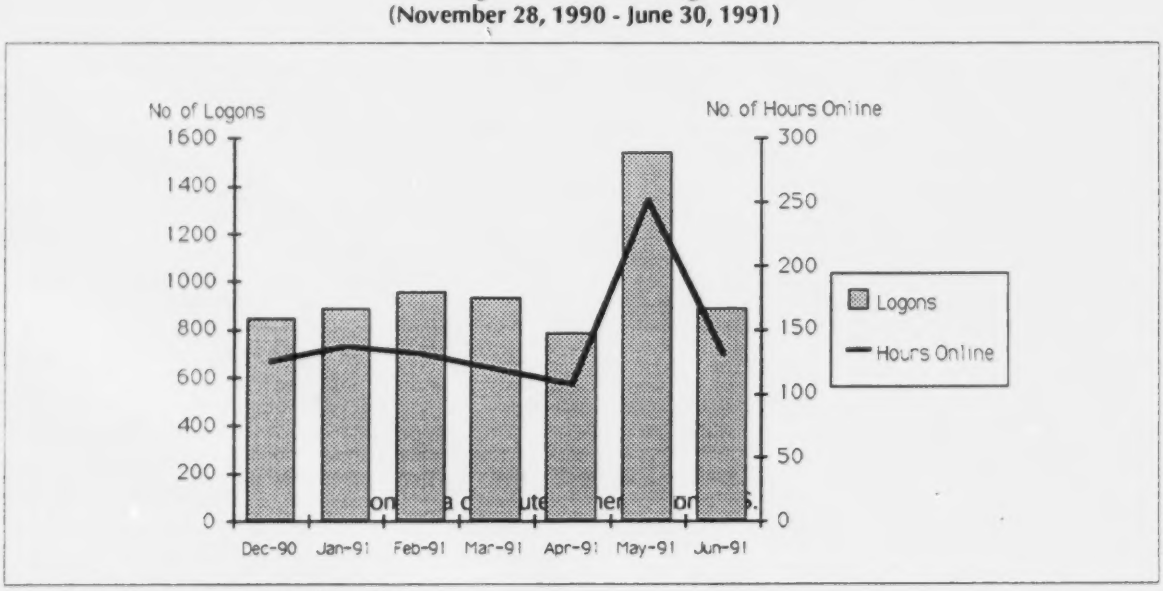
Some of the 19 SITP conferences were active throughout Phase 1, while others lasted only a few weeks. In five of the most active conferences the moderators had previous online experience. These conferences were: SITP.ETC, SITP-Prose, SITP-Write, Law-Forum, and Wired.Writers. Ask-An-Expert was also very active throughout Phase 1. The variety of topics addressed and the open access to both SITP and non-SITP schools helped to ensure their continued interest and activity.

Most of the Environmental Studies conferences ended after a few weeks of activity. Two teachers commented on difficulties with the environmental conferences:

"The environmental conferences were open ended and did not have specific direction. For example, we did not know when the conference started and when it would end. But we have learned from the experience and for Phase 2 we are developing environmental conferences that are much more structured."

"Unfortunately, the Environment component was made very broad at the beginning and this nebulosity was compounded by the introduction of a new technology. We were supposed to do some off line work on water quality—go to the lake, get a sample of water, bring it to the school

Figure 14: *Forum usage
(November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

* The increase in May is due to course online activities of the SITP teachers enrolled in the Masters degree "Telecommunications and the Curriculum" while taking the course *Research Methodologies in Education* (Edu 867).

Table 8: SITP conference usage
(September 1, 1990 - August 31, 1991)

Conference name	No. of discussions	No. of participants	No. of messages	No. of lines of messaging
SITP-Prose	39	32	166	5211
SITP-Write	76	49	197	3401
Wired.Writers	567	66	2563	48404
Write.with.you	100	24	267	4285
SITP-Writeplan	3	8	25	343
SITP-Writingplan	4	13	11	361
Ask-An-Expert	44	750	768	8590
SITP-Salmonid	6	42	120	1250
SITP-Environet	9	56	33	126789
SITP-Enviroissues	2	33	7	37
SITP-Habitat	4	37	24	348
SITP-Habitat_2000	6	27	15	84
SITP-Recycling	1	34	9	76
SITP-Mining	2	22	7	158
SITP-Weather	5	28	39	901
SITP-Water	5	43	57	492
SITP-Snow	4	28	21	106
SITP-School_Gardens	6	22	15	84
Law-Forum	40	1142	1038	20414
SITP-History	3	26	7	58
SITP-Info-Systems	23	45	97	1477
SITP.ETC	28	163	384	5869
SITP-Kidsnet	59	65	290	44740

These conferences are described in Appendix III.

From data computer-generated on MTS.

lab and do the analysis—but this was delayed by the bad weather and a lack of sampling apparatus."

For Phase 2 the conferences have been better planned and designed. It is expected that they will be more active and ongoing.

The Web

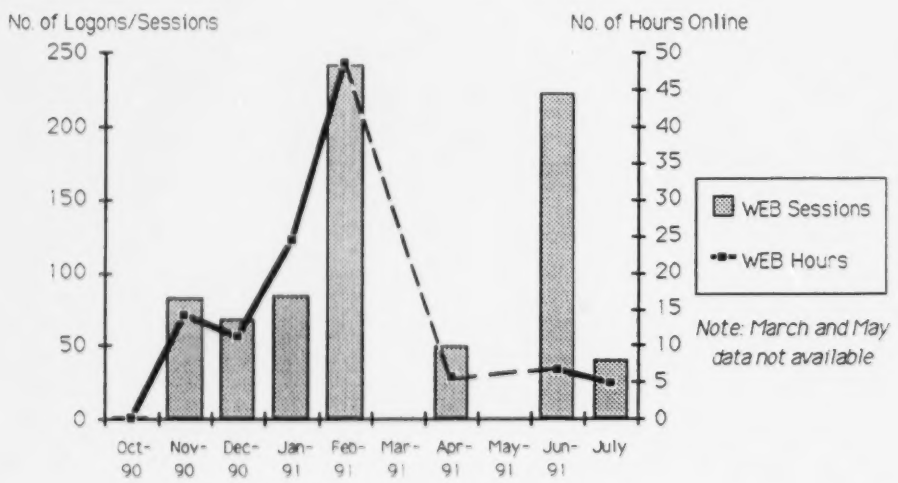
The Web, a conferencing system housed in Toronto to support a network of nonprofit organizations, is dedicated to providing conferences and databases on topics of environmental studies, peace, human rights, and international development. Twenty-two Web accounts were given to project participants (2 per district). Figure 15 shows monthly usage patterns on the Web.

AT&T Learning Network

AT&T Learning Network is a conferencing system owned by the AT&T Group. Several SITP schools joined the AT&T Learning Network which allowed them to communicate with other classes around the world. The AT&T Network has developed an approach to online learning called the Learning Circles. This model is based on group activity and structures the interaction along curricular themes and a maximum of eight sites for each group (Riel, 1990). The global communication links forged through AT&T allowed for a rich interaction among students from different cities and countries:

"My class was on the AT&T Network. My kids really enjoyed the ability to talk to other kids in other places. One of the highlights was having

Figure 15: Web usage (October 1990 - July 1991)



Data from iNet usage statistics.

This student types her poem into the Writing conference.

them to do work and to exchange messages with classes from very different cultures. We also exchanged pictures and it was interesting to watch my kids go through the pictures and make comments such as 'Oh, that's what that person looks like.' "

The following quote from a teacher describes the excitement of students to exchange ideas with peers from so many places in the world.

"We had access to children from a number of exotic places through the AT&T Network and just because of that the students became quite excited. But after a while they realized that the most important aspect of the program was the exchange of ideas and the fact that they were dealing with kids who were very much like them."

One of the strengths of the AT&T Learning Circles was the emphasis on offline activities that involve an entire class. These tasks, which are part of collaborative projects of the Learning Circles were later uploaded to the other schools in the network. One teacher-librarian commented:

"Even though I had four or five kids who did the uploading and downloading of files, I still considered that the whole class was online because they were doing offline activities which ultimately went online. The hands on computer time was actually trivial because of the ease of use of the software. I think that ease of use is a major consideration. It's a matter of using one command to upload a file ... it's so slick... and the focus becomes on the offline activities."

The AT&T Learning Network provided the opportunities to exchange information, to share ideas, and to foster collaboration among children all over the world. Both students and teachers benefitted from this exchange and were positive about the experience.

Databases for classroom activities

Online databases are repositories of information for any particular item a user needs. The user does an online search on a particular topic, assesses the information, and saves it to a file for later use. The search and access to particular topics do not require the support of moderators.

Students, however, need to learn the skills to do online searches. The development of these skills is important for students, particularly in later years of high school, as these skills are required in colleges and universities.

Access to databases is also important for supplementing libraries with up-to-date information and resources. One elementary librarian noted:

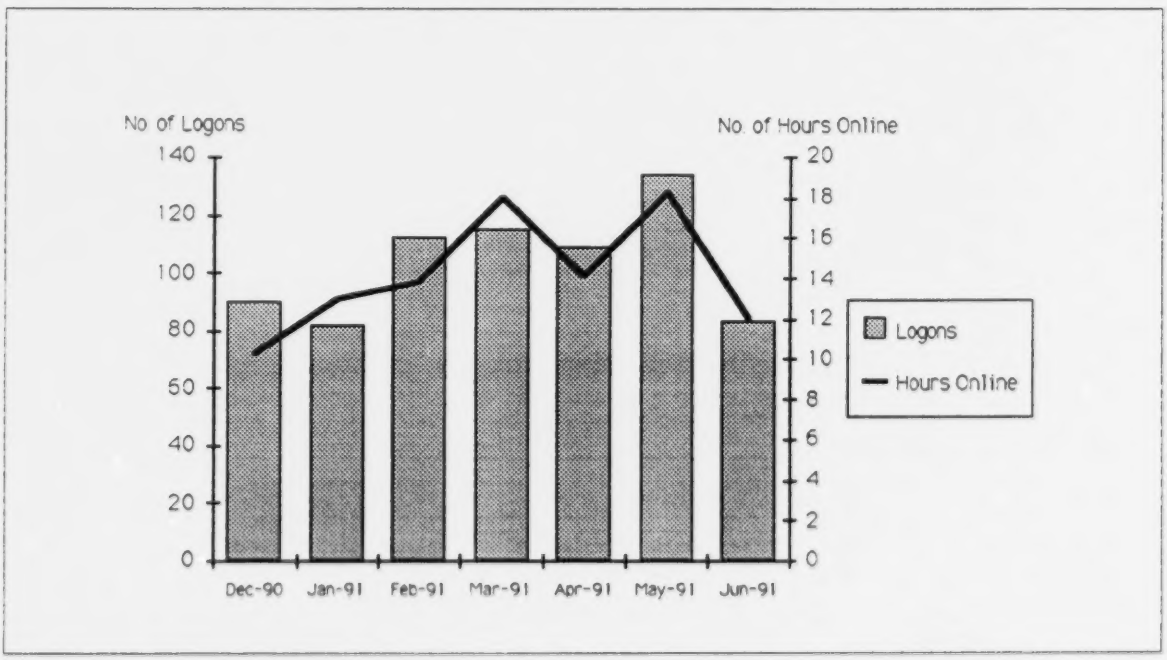
"The libraries are not up-to-date and they can't be anyway. There is so much new information that a library can not keep up and access to databases through telecommunications is needed. I think that in the near future all libraries will have to have access to information technologies."

For elementary students, however, teachers reported that online mentors or experts were more appropriate than databases because of their limited reading ability. Online mentors can modify the style of their responses to fit particular student queries and their reading levels. A librarian reported:

"I'm from a primary school and we did a little bit early on with trying to get into these databases. We found that once we accessed them the kids couldn't read what was in there anyway. It was totally useless. Whereas with the online discussion the kid could say 'I'm in grade 3.' Dr. Spider, the mentor, would then make the appropriate answer to the grade three kid. I found that was really neat."

Three educational online databases are available through MTS and therefore accessible to all users, including SITP participants: Grolier Encyclopedia, SFU Library Online, and ERIC. The educational network Bitnet was also used to e-mail people in other countries and to access online archives and databases on various topics. The commercial online databases, while providing a wide range of up-to-date information, are expensive (see Figure 2). Through a limited number of IDs (two per

Figure 16: Grolier usage
(November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

school district), SITP participants can access two commercial databases: Dialog and News$ource. Next, usage information for the educational and commercial databases is provided.

Grolier encyclopedia

The text of the Grolier encyclopedia is available in database format and is accessible through MTS. Figure 16 shows the use of this database by SITP participants during Phase 1.

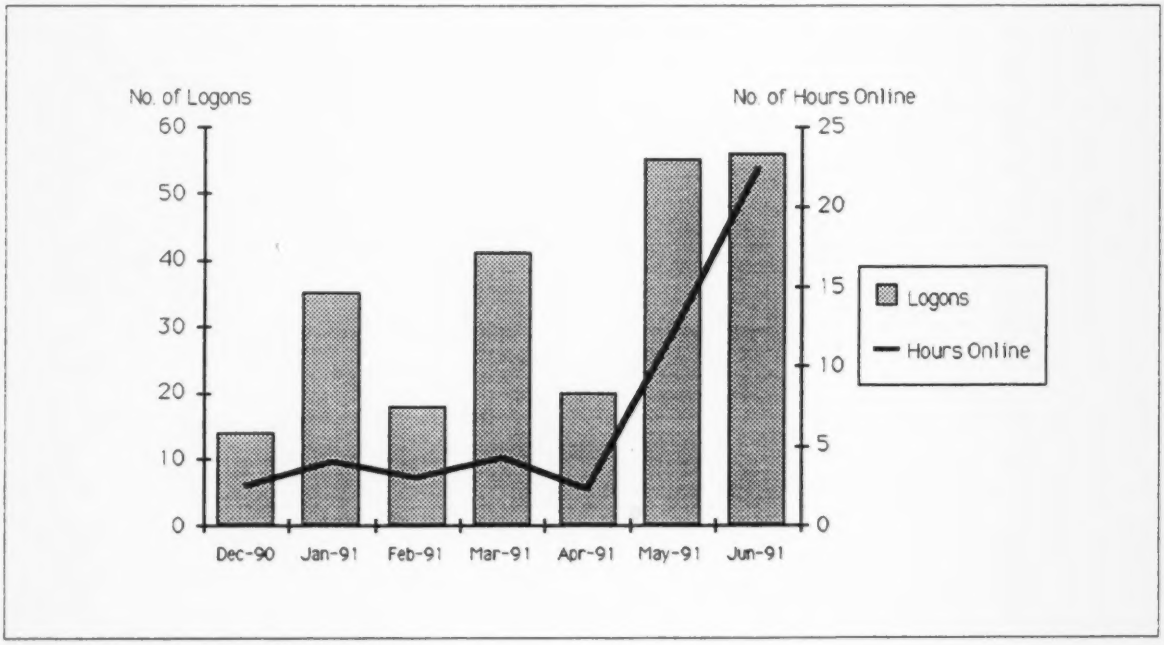
SFU Library Online

The SFU Library Online database contains records for all materials available at the Simon Fraser University Libraries. It was not placed on the SITP Services menu and so its availability may not have been realized by some of the SITP participants. However, many participants did exit the SITP Services menu to access the SFU Library Online to search for books and magazines and to borrow books through its inter-library loan system.

ERIC

The ERIC database produced by the Education Resources Information Center (ERIC) is maintained at the University of British Columbia (UBC) but it can be accessed through SFU's MTS system. ERIC contains detailed abstracts of articles from educational publications and is divided into three parts: New ERIC (most current five years), Old ERIC (preceding one year) and RIE (most current five years). The first two cover only journals while RIE covers documents including books, proceedings, reports, etc. Figure 17 shows SITP participant usage of ERIC. The

Figure 17: ERIC usage
(November 28, 1990 - June 30, 1991)



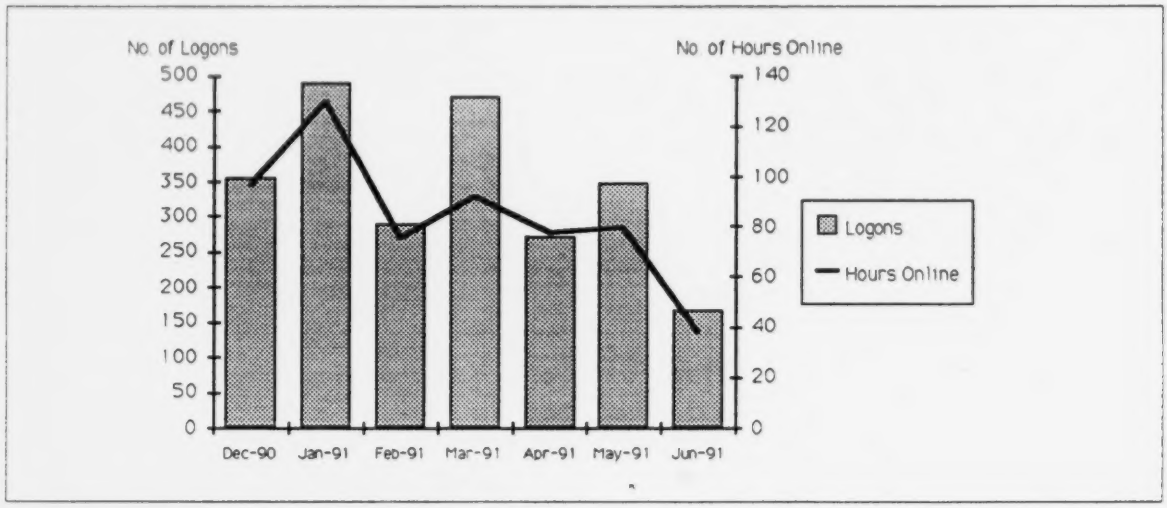
From data computer-generated on MTS.

dramatic increase in May and June reflects the research activities of the SITP teachers enrolled in the Masters degree "Telecommunications and the Curriculum" while taking the course *Research Methodologies in Education* (Edu 867).

Dialog

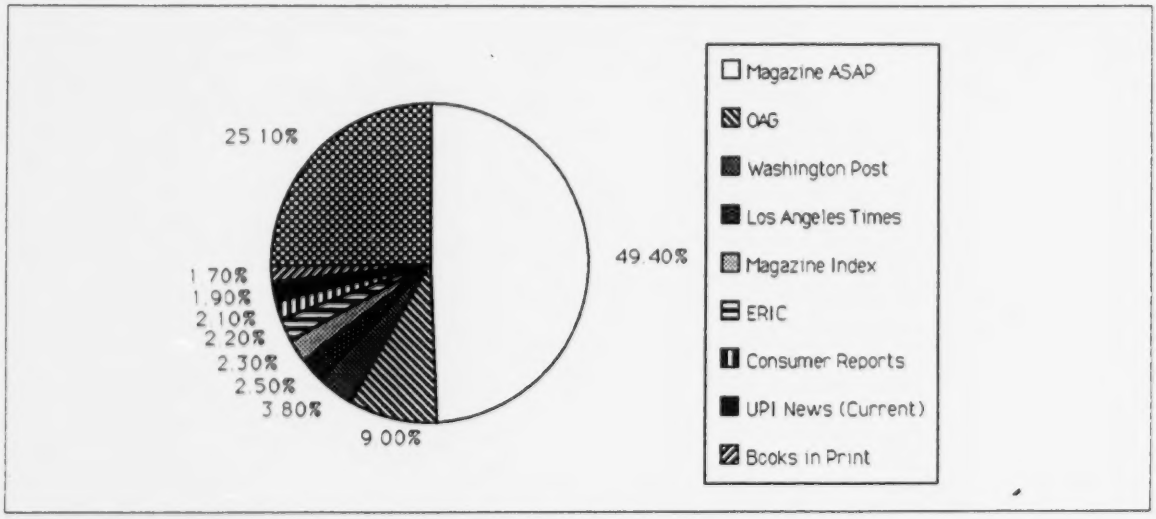
Dialog is a commercial gateway service to a variety of online databases. It was widely used by SITP teachers and students as shown in Figure 18.

Figure 18: Dialog usage
(November 28, 1990 - June 30, 1991)



From data computer-generated on MTS.

Figure 19: The top 9 Dialog information services by SITP usage



From Dialog usage statistics.

One elementary librarian reported that his school "used the magazine index quite a bit on Dialog to stay up to or get ahead of the library seeing how there is a lack of resources there." The focus on research was most typical of the secondary school level user. Dialog's ASAP full-text database was especially popular.

Figure 19 shows the nine most popular Dialog information services used throughout the 1990/1991 school year by all (22) SITP account holders.

News$ource

News$ource is a Canadian commercial online database that contains, among other items, major Canadian newspapers. In SITP high schools, teachers found Southam's News$ource to be "really useful, both in social studies and the sciences as a research tool." Database searches, conducted by both students and teachers, ranged from "raising goats to treating cancer" at one school. It was used to fill in information inadequacies from other sources, such as textbooks, and add a different dimension to science studies. For example, one teacher noted:

"A lot of things like cancer and genetic engineering in the grade 12 biology course, where there is precious little in that addendum that they have in chapter 34 in the end of the book, could be searched online. We've been able to scrounge up all kinds of quite current and good material from those articles. Database searches are also good to lend a personal touch to some of the research students do. They can obtain information on case studies related to research topics and add it to their work. "

News$ource was also used to assist students compete against other BC schools in a stock market game:

"We had a really good time using that in conjunction with a stock market game where there was a competition among BC schools. I think it's good for kids from a small rural community to find out that they finished in fourth place, competing with bigger schools in the lower mainland. It's tremendous boost for those small communities to realize that they don't need to be so disadvantaged because of their distance from large centres."

Participant Feedback on Databases

Participants used database services extensively in Phase 1. The use of commercial databases is costly and requires different skills from those used in computer conferencing and electronic mail.

Various comments were made by SITP librarians and teachers regarding the usefulness of databases, the costs involved, the need for training to develop effective database literacy skills, and characteristics of databases important for classroom use.

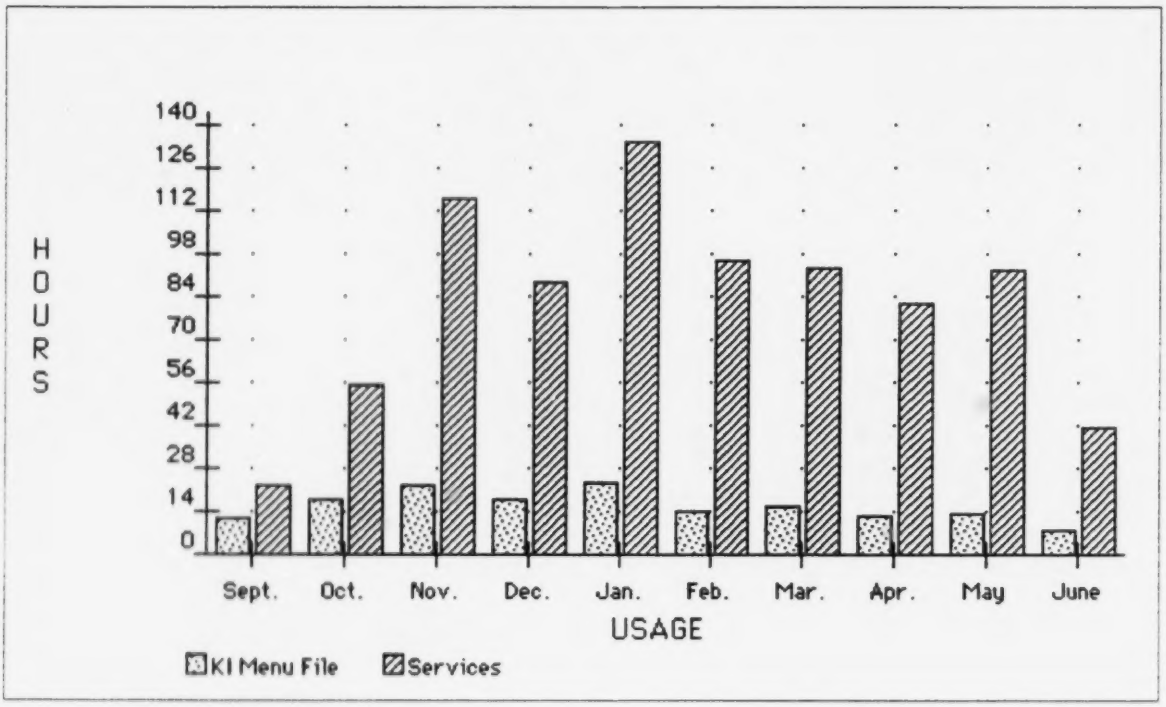
Database access presents a world of immediate information to students. It also changes the relationship of the teacher and learners to information. When information comes from a wide variety of sources and teachers have less control over the information received, the critical evaluation of information and information sources becomes a key skill. In classrooms, this skill was honed by exploiting opportunities presented by the databases. Two teachers reported strategies developed to critically examine sources of information in the classroom:

"With a hockey game we went to a Chicago paper and got their perspective on how their team had done and then we went to... the other team's paper. Actually a kid came up with that idea. It was really neat to see how home papers dealt with their own team."

"We did a similar thing with reports on Iran in the U.S. newspapers and the Russian newspapers on the databases We tried to evaluate the differences on how it was reported, what was reported, and the slant that the paper gave it..."

In another school, databases were used to research current issues for a journalism class:

Figure 20: Time spent searching databases vs. time spent at the menu



"One group writing an editorial on drinking and driving asked some questions on the law forum, went into the Southam News$ource, pulled an editorial from the Calgary Herald, and were able to access about three or four different tools to be able to put together their editorial and was able to deal with most of that in about 20 or 30 minutes. They found it really, really good."
(A grade 11 teacher)

Teachers were concerned about the cost of databases searches but noted that students are not aware of costs as a factor. One teacher noted:

"This project has facilitated access to a lot of extra information... That's probably the one weakness of it as well. When the kids leave school they are going to go into the world of reality where some databases are going to cost them $180 an hour... That's something I see as a real weakness. Many times kids do not value the online time they are given..."

Students are still unskilled in the use of online databases and may spend substantial time to set up a search as shown in Figure 20.

There are, however, effective and unexpensive ways to train students on the use of databases. One teacher commented, "the whole area of being able to play with descriptors is very important." Offline training packages would be less costly than practicing on online. CD-ROMs were also recommended to allow practice in a more comfortable and relaxed situation as one component in an offline "learning package" for students. Support materials for teaching searching strategies and a print glossary of search terms were mentioned.

What skills are needed for effective database use? Focus group participants listed a variety of necessary database literacy skills which students should learn:

- keyboarding
- boolean logic
- ability to formulate and articulate clear questions
- process of search strategies using descriptors
- risk taking
- problem solving
- attitude of confidence
- vocabulary
- not being intimidated by computers
- basic computer skills (e.g. how to create and save a text file, uploading/downloading files).

Regarding the content of databases, two needs were emphasized by participating teachers: (1) more access to Canadian information, and (2) access to information relevant for specific curriculum areas.

(1) Canadian information

Obtaining Canadian information is as important in the realm of databases as it is for textbooks. News$ource and The Web were the Canadian databases accessed in Phase 1. (Dialog, an American database, also contains some Canadian information.) The number of accounts was limited and not all participants were able to research Canadian topics effectively. An elementary librarian, without access to these databases, wrote:

"Often teachers ask student to research Canadian topics of current event-type subjects but there is very little to draw on. When will the Canadian newspapers and magazines become available? My usage would increase dramatically if this was obtained."

If databases are used as a substantial source of information in schools, access to Canadian views, opinions, and information through these databases becomes a key issue for educators and students.

(2) Information relevant for specific curriculum areas

Another issue raised by participants is the relevance of the databases to curriculum areas. A grade 12 teacher-librarian commented about Dialog:

"Retrieval of curriculum relevant data for the sciences and maths in Dialog was not easy. Journals and abstracts are sometimes too complicated and the articles are seldom retrievable in full text. I knew this from the start but most new users expect textbook articles and are quickly disappointed."

While these difficulties were reported, teachers still mentioned that most curriculum areas can benefit from access to databases. Teachers from different subject areas used these services to complement information required for class projects.

Student use

Information on student use is minimal for two reasons: (1) there were no student accounts assigned during Phase 1, and (2) student participation in the project began later, only once teachers received hardware, software, and were trained in the use of online services. During Phase 1 the focus of SITP was placed on the teachers, not students. Teacher initiative and available hardware resources determined the extent of student participation. Among members of two SITP focus groups, the number of students per teacher or librarian who had used CMC ranged from 10 to 120. Based on information provided by questionnaire 3 respondents and the focus groups, it is estimated that approximately 3000 students were exposed to CMC in Phase 1.

Questionnaire 3 results indicate that students have gained some telecommunications skills such as typing in information to create a text file, logging in to online services independently, uploading and downloading text, and independently conducting a database search, but that the percentage of students with these skills is still low.

For administrative tasks

While the SITP project emphasized the use of CMC to support learning activities, teachers also expected to use it in the support of administrative tasks, as reported in questionnnaire responses (August 1990). Data collected in August 1991 show that a few participants used CMC for administrative tasks (see Table 9).

While these types of use were identified, they were not as extensive as expected. Only 12.9 percent (8/62) of respondents to questionnaire 3 indicated that they used CMC during Phase 1 for administrative activities. Administrative information communicated via CMC included information on timetables, software reviews, hardware comparisons, and information on new products. Teacher Federation communication (indicated by one respondent) included e-mail and conferences dealing with bargaining, leadership, grievances and curriculum development.

Table 9: Administrative use of CMC during Phase 1

Activities	No. of responses	% of 8 (total) users of CMC for admin. purposes
Problem solving	6	75.0
Messaging to administrators	4	50.0
Sharing administrative info. between schools	4	50.0
Sharing administrative info. between districts	1	12.5
Other *	2	25.0

* CMC was used by one respondent to electronically order library resources. The other activity was to communicate between the local teacher association and those in other districts and the British Columbia Teacher Federation (BCTF).

Data from questionnaire 3.

Impacts of computer-mediated communication

The introduction of computer-mediated communication into the schools of the Southern Interior had various impacts. The following sections report the impacts on SITP teachers, librarians, and other participants during Phase 1. They are discussed as impacts on teachers, students, and schools. Finally, the overall impacts of the Southern Interior Telecommunications Project during Phase 1 are listed.

Impacts on teachers

Telecommunication use during Phase 1 generated teaching benefits and influenced the nature of the teacher's role. Benefits were indicated both in terms of classroom teaching experience and in terms of professional impacts. The five educational and professional benefits most frequently reported were:

(1) Increased access to information,
(2) Facilitated access to help and ideas from colleagues,
(3) Connected the classroom to the world outside,
(4) Increased awareness of new computer technologies, and
(5) Changed role of teacher: from a dispenser of information to a facilitator or resource person.

(1) Increased access to information

Teachers noted that telecommunication access: "Broadened my ways to communicate and get information for students," and "added a new dimension to doing research." They found that information was available faster and they were able to incorporate "up to the minute information" in their teaching.

(2) Help and ideas from colleagues

Sharing information and ideas with colleagues was an important part of collaborative activities. Through the exchange of information and mutual help a teachers' network was set up in the southern interior. Peer communication and support was especially valuable for teachers who were the lone teacher in a certain subject in their district or area.

One teacher commented on the importance of peer input and idea sharing:

"With the computer, you've got a broader audience so when you put an inquiry [into a conference] you may get an audience there that you weren't even counting on and input that in some cases will blow you away in terms of both the number of people responding to you and some of the comments you get that you hadn't even thought of. I recall in the fall... we were trying to get something arranged ... about teacher assistance purchase of computers over in Princeton. I just put a general inquiry out there and I received all sorts of interesting suggestions that hadn't occurred to me. If one relies on the more conventional forms of mail then you have your mail directed at a particular person or group of people. Just by the very nature of the medium you shut out that periphery out there that sometimes could mean a tremendous amount to what you are doing."

(3) Connecting the classroom to the world outside

Teachers noted that telecommunications helped diminish the feeling of isolation both of the school and of the community. The project connected classrooms to the real world. One teacher wrote that it "expanded my thinking beyond school walls." Another said, "I feel like I am at least letting students look at the real world." One grade 2-7 teacher noted that SITP "provided a focus on themes that network the valley together [and] makes us become more aware of our neighbours."

(4) Increased awareness of new technologies.

During Phase 1, telecommunications technology was introduced to many participants for the first time. Through exposure to the possibilities that CMC allows, participants have become more aware of opportunities to change and improve classroom learning and resources. Awareness of the opportunities and possibilities afforded by telecommunications technology sparked enthusiasm and curiosity among SITP participants. Figure 21 lists the most commonly mentioned changes in attitudes about teaching since implementing CMC in the classroom.

(5) Changing teachers' role

In August 1990, participants reported their expectations of how their role as a teacher might change with the introduction of computer-mediated communications in their schools and the Networked Classroom. The three most frequent responses were:

(1) Become a facilitator or resource person,
(2) Become more in touch with current information, ideas (expands resources), and
(3) Expand boundaries or teaching beyond school walls.

Figure 21: Attitude changes from CMC implementation in the classroom

- **Teacher becomes more of a facilitator:**

"Starting to act more as a helper than an expert."

"I have taught less, guided and encouraged more and helped children explore their own abilities and needs in order to make full use of their potential."

"I view my role as teacher as one of showing students how to access information and consult others rather than being the 'source of knowledge.'"

"Become more committed to developing independence in students and collaborating with teachers and students to be more creative and open to new methods and topics."

"I have become more of a facilitator and learning is more student directed."

- **The use of CMC increased enthusiasm:**

"Renewed enthusiasm, more relaxed, feel better about my role working one to one more often."

"More interest and energy."

"Made teaching more exciting."

"Renewed motivation."

- **The amount of information available increased:**

"Unlimited numbers of ways to present materials."

- **Other:**

"More willing to 'let students go' to explore ideas."

"Along with Year 2000 and CMC I look for opportunities to allow students to become involved in their own learning."

"More open to new things, less fear about technology. I love the face to face meetings and the collegial atmosphere ... the opportunity to meet with other teachers in similar curricular areas."

"Acceptance of change."

Data from questionnaire 3

Making changes to overall teaching strategies requires a great deal of effort on the part of each teacher, especially in consideration of the limitations and complications experienced during Phase 1 (see Obstacles). When actual impacts were reported on questionnaire 2, the most popular expected impact on the teacher's role, that of becoming more of a facilitator or resource person, was not mentioned. However, by the end of the school year, changes in teaching strategies were frequently expressed. One teacher explained how he altered his teaching activities during the year:

"In most other years with biology, I've said 'all right, we'll do this unit and this unit,' get some input from the kids in terms of their favorite and go with it. This year I threw it wide open. I said, 'pick anything you like. I don't care whether 10 of you are doing the same one option or 1 or 2 of

Figure 22: Changes in teaching strategies or behaviours for effective use of CMC in the classroom

- **More planning is needed.**
- **Changes in activities to emphasize process are required:**

"More independent, flexible, and individualized activities were required."
"More flexible management" was required
"Process vs. product ... allows students an opportunity for independence and experimentation."
"Teach thinking skills, research skills and stop presenting facts. Challenge children to explore."
"Greater expectation to have student learn to get information rather than teacher provide 'the answer.'"

- **Teachers should give students more responsibility in the learning process:**

"Greater responsibilities were given to students to plan and work in projects."
"Let the students 'do'—write, react, their own personal strategies and ideas ... point directions, you can't do it all."

- **Teachers should emphasize individualized education:**

"Less emphasis on total group learning and realization that not all students will receive the same information."
"Focus on learner as individual."
"More individualized instruction."
"Individualized educational programs for students."

- **More teamwork is needed:**

"More cooperative work."
"Use of small groups and lots of hands on time."

- **There is a need to keep "rest of class" busy when a few students are telecommunicating:**

"Have work for those who are not online and who are waiting to go online."

- **Other:**

"Flexibility, patience."
"More open-ended activities to allow for information found online."
"Less dependence on text sources."
"More cooperative planning between classroom teachers and teacher librarian to incorporate CMC into classroom learning and research."

Data from questionnaire 3.

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you are doing the same one.' They had free range of the entire 6 options and basically I became the facilitator. I went running all over the school — online, offline everywhere—trying to get materials for them. It was busy but I think it worked well. Level of commitment sure went up and I had several students who relied a number of times on things like News$ource to pull out information that they were having a lot of difficulty finding at the library level or at the textbook level. In terms of the essays they were generating from it ... it seemed to work well."

Changes in teaching behaviours were further explored in questionnaire 3. Figure 22 indicates participants' perceptions of changes in teaching strategies or behaviours needed to effectively use CMC in the classroom.

In summary, while expectations of the impact of CMC in the schools focussed on changes in teaching strategies, the main impact experienced during the first half of the year was improved access to current information. This reflects the relative ease of adapting CMC to the classroom as an additional tool for obtaining information. However, during the second half of the year the changing role of the teacher—from source of information to facilitator—was highlighted as telecommunications were further integrated into the classroom activities.

Impact on students

Reported impacts on the classroom were many and varied. Student benefits ranged from the development of computer and data manipulation skills to gaining a more global awareness. In August 1991, participants indicated the most relevant student impacts in their personal situation and use of CMC. Overall, the four most frequently mentioned categories during the year were:

(1) Greater access to information,
(2) Increased enthusiasm,
(3) Allowed students to share with a greater group, and
(4) Brought real-world relevance to work done in the classroom.

(1) Greater access to information

Access to a greater amount of information, and more current information than what is available in school libraries was a frequently noted important student benefit of SITP. In the words of one teacher,

"Some of the kids who have done traditional research certainly see the benefits of CMC. It is a lot easier, there's a lot more information, and they can access a lot more a lot quicker."

(2) Increased enthusiasm

Students were motivated by contact with expert and mentors online as well as other students. One grade 8-12 teacher noted that through CMC students "are getting more turned on to learning." An elementary librarian commented:

"The most useful aspect of CMC was to actually communicate with people in other places. That's where we found it most interesting and most motivating to the kids... to exchange stories, letters, [and] personal feelings across Canada as well as internationally."

Students indicated to teachers that communication with students in other countries, such as one class' communications with a student in Saudi Arabia during the Gulf War, was the high point of their school year. One teacher observed that generating such excitement and motivation may be key to instilling "lifelong learning" potential:

"If students can get excited about something—if at the end of the year they can remember something that happened a few months back and think that that was exciting—they may carry that on... and get excited about their own learning."

In other cases, access to online databases ignited enthusiasm:

"With my class of grade seven students ... it was a year of awareness. They were more aware that the modem did exist and they could use it. That ignited something—they wanted to find a lot of information."

In one school, this enthusiasm spilled over to another computer use—desktop publishing:

"The thing that I noticed over and above the telecommunications aspect of the project has been that the awareness of computers as a realistic tool for these kids to use... is just mushrooming for desktop publishing now. ... They're in there all the time typing up their story or whatever to publish it. ... Awareness of computers as a tool has just exploded and I think largely because of the motivation or the excitement or the interest that came from telecommunications originally."

(3) Allowed students to share with a larger group

Telecommunications broadened students' horizons beyond their school and immediate community and contributed to greater global awareness through the immediacy of communications. They received feedback and answers from persons outside their immediate environment. In some cases, online writing mentorships were fostered between higher and lower grade students:

"In our district we had writing mentorships between some grade twelves and some grade five and six students... through e-mail... The grade twelve students were in a writing class so they were receiving credit for their comments upon the other writing."

One interesting case highlighted the new opportunity which telecommunications can create for students with disabilities:

"I had a student with cerebral palsy and he had some pen pals who wrote to him [via e-mail]... as an equal. It was a really interesting experience... it was really a level playing field for him which was totally new."

Contact among schools in SITP provided opportunities for face-to-face meetings as well as telecommunicated messaging. Towards the end of the school year, a grade 2 class met with another Okanagan school class they had communicated with online.

(4) Brought real-world relevance to work done in the classroom

The relevance and real-world setting which telecommunications allowed for classroom work was improved for both students and teachers. As noted by a high school teacher:

"School is different than the rest of the world, it's not real life. I think that with telecommunications the fact that we can communicate outside of that classroom to people in the rest of the world has a lot more relevance than some of the things that they learn in the classroom and in that school."

This real-world linkage has importance to the student's work as well.

"I think that telecommunications helps them to appreciate there is some importance to what they are doing and it has some relevance to what's going on in the world."

General school impact

Respondents to questionnaire 1 (August 1990) believed the impact of computer-mediated communication on the school would be generally positive. Expected benefits included improving contacts with the outside world, having access to the latest in resources "second to none in the province," and encouraging cooperative projects with other schools. Other respondents mentioned an increased need for inservice training and investment in the use of the technology. Four main categories of anticipated impacts of CMC were identified:

(1) increases awareness and exchange of ideas with outside world,
(2) increases access to information,
(3) improves teacher development and peer interaction,
(4) fosters an interdisciplinary approach to learning.

These impacts were repeated by teachers throughout Phase 1. The first three have been discussed in this report. Fostering an interdisciplinary approach was also evident as topics of interest examined via telecommunications did not always neatly fit into one subject category. For example, the Environmental conferences were structured to incorporate this interdisciplinary approach. One grade 6 teacher mentioned that telecommunications "has proven to be a great motivator to student-centred 'constructivist' learning."

As there was little administrative use involving CMC on administration during Phase 1, the impacts of CMC were not very noticeable in this area. As indicated on questionnaire 3, CMC facilitated sharing information and facilitated problem solving of administrative matters but only 25 percent (17/68) of respondents indicated any perceived administrative impact.

Other types of impacts reported by teachers included an impact in the local community, i.e., how a SITP school's access to information helped inform the community about an environmental issue:

"I had a reporter from the local paper come to me and say 'what do you know about incineration of hazardous wastes' because R—— was looking at a proposal for Princeton. ... She was aware because of articles in the paper that we were connected with SITP. I said I'll see what I can do for you. The next morning ... we had 75 pages of information for her on the laser printer. She based three articles on that. So in terms of informing a real public about a real problem, SITP has been useful."

Finally, more general types of impacts of the project were also reported. Ranked by frequency of mention by participants these were:

(1) getting the system up and running and getting teachers familiar and comfortable with the system,
(2) increasing awareness of the potential of telecommunications in education,
(3) improving access to information,
(4) establishing a good network among teachers, and
(5) motivating students to participate and learn.

These responses reflect the slow start-up of the project in Phase 1 due to training needs of teachers and installment of hardware: "Awareness of potential" dominates actual outcomes from using the services. As one teacher reported: "I see all the possibilities out there but I don't know how to get there yet."

During the first months both database and communication services were being used, but use of these services in the classroom was limited. Improved information gathering and communication between teachers were seen as the most noticeable outcomes of this first stage. A grade 4-7 teacher reported:

"*The first part of SITP has accomplished the goal of getting comfortable with using telecommunications, and by looking at the numbers it has far exceeded the goal. I feel the next step is to have the project laid out with specific and well laid-out plans for people to get involved in. You now have a lot of 'techie' people on-line, and to get other less interested people we have to create shorter, well-directed, and specific projects with a definite goal.*"

Obstacles faced by participants

Five main barriers were encountered by participants during Phase 1:

(1) Lack of time,
(2) Lack of access to hardware,
(3) Problems with software,
(4) Need for inservice training, and
(5) Lack of direction on how to integrate use of CMC with the curriculum.

These difficulties, reported in January 1991 on questionnaire 2 and during the focus group sessions in June, generally persisted throughout the year. Some of these difficulties have been resolved during Phase 1 and many have been addressed during Phase 2 planning.

(1) Lack of time

Lack of time was the most frequent problem encountered in the project, mentioned by 69.3 percent (52/75) of respondents to questionnaire 2. Table 10 shows the six main problems or tasks taking up most of participants' time.

On a weekly basis, the time participants spent online ranged from 10 or 15 minutes to 10 hours. In addition, much time was spent off-line preparing online activities—up to three times what was spent online.

During Phase 2, students will be increasingly taught to use the system, which will overcome the time-consuming task of uploading and downloading. These student experts will also help other students learn the system and will answer many questions. Thus, the teacher will no longer be the only source of information and gatekeepers to the system, and the time taken up helping students with technical matters, or doing these activities themselves, should decrease.

(2) Lack of access to hardware

Hardware set-up and delivery was the second greatest problem encountered in the project (after lack of time), mentioned by 36 percent (27/75) of respondents to questionnaire 2. While teacher access to computers seemed good, student access

Table 10: Problems taking up the most time during Phase 1

Task/problem	No. of mentions	% of total respondents
Lack of time	42	56
Learning	26	34.7
Training needed	17	22.7
Designing tasks	17	22.7
Hardware	11	14.7
Software	7	9.3
MTS front-end	1	1.3

Data from questionnaire 2.

was generally low. This led to some frustration among students anxious to get online. As one teacher reported: "I think the kids can really see the benefits but they also see the frustration in that they can't get the access they'd really like."

Respondents to questionnaire 2 indicated that teacher access to a computer at the school was good with 62.5 percent of teacher respondents (25/40) indicating more than 27 hours per week was as needed or unlimited access. Student access, however, was low with 42.5 percent of students (17/40) having 2.5 hours or less per week access to a computer. Most access was available on their own time, not during class, and some teachers expressed difficulty "using just one modem with a class to do anything meaningful."

Access to equipment in the place where a teacher teaches was noted as a significant adoption factor. A secondary school teacher reported:

"I teach in about 3 different classrooms and unfortunately in order to be able to access a computer with a modem, I have to leave my classroom with those people who are wishing to work on that... I have 15 kids who are involved ... over a period of a year, and that could probably be a great deal larger if, again, I had the facility or the equipment in the area where I teach."

More stand-alone equipment could help fulfill this need for convenience, and could be shared among teachers. Table 11 notes where computers are located in SITP schools, and Figure 23 illustrates the relative convenience of these locations to participants.

Table 11: Where are computers located in the school?

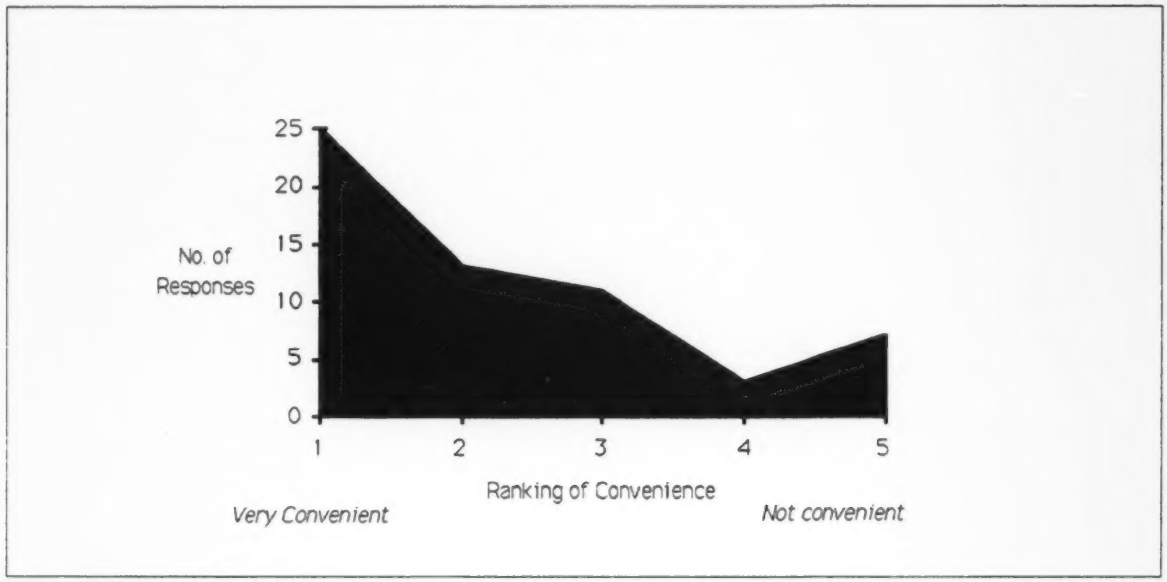
Location	No. of responses (Questionnaire 2)	No. of responses (Questionnaire 3)
Classroom	55	26
Library	53	46
Lab	50	46
Other *		20

* These responses were: office/administration (9), other/all classrooms (6), staff room/teacher centre (6), counsellor's suite (2), telecommunications centre, hall, typing room, and "in a small room, not very accessible," (1 response each). In addition, one school had 30 portable laptops. Respondents were free to list as many locations as applicable.

Multiple responses were common. Thirty-seven respondents indicated all three of these locations on questionnaire 2, while 14 indicated all three on questionnaire 3.

Data from questionnaires 2 and 3.

Figure 23: Are computer locations convenient for you?



Data from questionnaire 3.

As teachers became accustomed to telecommunications and the focus shifted to student use, one school changed their computer configuration. During Phase 1, the computers were located next to the teachers' desks, so they could get used to it. During Phase 2, three computers will be located in a computer lab to facilitate student use. This change appeared to be supported by the teachers involved:

"I think it was important in Phase 1 to have a modem [and] computer next to my desk so I could get more familiar with it ... but in Phase 2 without too much cost we can make it much more beneficial to a lot more kids."

Many schools have increased their amount of hardware during the past year, and more teachers will be able to access SITP resources in Phase 2. In addition, project planning for CMC activities are focussing on overcoming the "modem bottleneck" by emphasizing off-line activities which can be batch-uploaded at a later time. A purchase plan for teachers to obtain hardware for telecommunicating at home was also recommended. As indicated by MTS usage statistics, a great deal of telecommunications work occurred during the evening. In addition, the privacy and time home use afforded were noted as important factors in learning how to use the system.

(3) Software problems

Software difficulties, especially in regard to importing text or uploading, was the third greatest problem noted by 21.3 percent (16/75) of respondents. Software problems appeared to strike different services for different users. Both MTS services and databases were mentioned by teachers. One grade 5 teacher noted: "Xchange is very difficult for children because there are so many different commands and instructions. Hopefully it will become more friendly to users who don't often use it." Another mentioned that such software problems prevented effective use of databases:

"I don't know whether it's my fault [but] getting into Dialog and getting into Web... with my grade sevens was very complicated and no other teachers in my school were even wanting or willing to touch those kinds of areas but that's an area."

During the year, however, such difficulties were resolved as teachers learned how to develop macros to simplify telecommunications:

"We have [communication packages set up] now when the kids go on and use Dialog. One click takes them right through to the main menu in Dialog, and the student doesn't have to do anything—the bell rings when he's there."

In Phase 2, the MTS system will be replaced with more user-friendly e-mail and conferencing system called Participate (Parti). Telecommunications software scripting with macros will be a SITP service to make the selection and logon to SITP services easier. Also, interface design and development has been ongoing to improve ease of access to the SITP system and to improve consistency among users of different types of computers.

(4) Need for inservice training

"I think we need a better technical support service for the different districts. Something more formally set up than trying to get help from someone who knows what they are doing." (A teacher)

In questionnaire 2, learning to use the system was reported as a problem encountered in the project by 46.7 percent (35/75) of respondents. In addition, a need for more training was indicated by 42.7 percent (32/75) of respondents. Conferencing, Dialog information, and writing macros were noted as posing particular difficulties.

Towards the end of Phase 1, an additional full-time employee, Morris Vardabasso, was hired to assist with training and support of SITP participants. There will be two full-time employees (Morris Vardabasso and David Porter) and an SFU part time resource person (Enid Kristjanson) during Phase 2 to assist participants, and research and evaluation questions will include gathering information to indicate where assistance and support is most needed.

(5) Lack of direction on how to integrate use of CMC with the curriculum

Concern about the SITP conferences focussed on two elements: (1) curriculum relevance and (2) problems with conference structure.

1. Curriculum relevance

During Phase 1 telecommunication activities were often "in addition" to the regular curriculum. As a result they were often perceived and treated as an "add-on" extra in the classroom. A grade 5 teacher reported:

"I am enjoying participating in SITP-Write. I think, though, that it will take a long time to get the level of involvement and student participation (independent that is) that we, as teachers, would like to see. We have a lot of curricular things we have to do that leave little time for "fun projects" like SITP. The reading and writing my students are doing for the project is invaluable."

An elementary librarian commented:

"I think they should be curriculum-related so it's not an add-on thing. And it's just part of what the kids may be doing in the classroom. It's just an added part of it."

In Phase 2 SITP telecommunications projects are structured directly on the B.C. curriculum, to meet the needs of the curriculum, teachers, and students.

2. Conference structure

During Phase 1, the SITP conferences were found to be too open-ended and without any form of time scheduling. Some comments from teachers were:

"Not enough focus on how specifically the telecommunications might be used. Little direct focus from our district."

"I need a more specific project—I would like to see a project set up that is similar to National Geographic or AT&T Network in which the activity is clearly laid out and specific."

While less structured areas must be available for new ideas and exploration, and conference design should not restrict this activity, classroom activities with CMC require advance planning and structuring.

What makes a good online activity? Focus groups participants described the features of an ideal online activity as follows:

- sections should be defined ahead of time
- should be highly structured
- short time and a clear closure—classes do the work and finish, success should be evident
- what is wanted of participants, how to participate, and what to do are clearly defined (as a model they suggested the AT&T Learning Circle model)
- clear to see how online activities fit in with own goals in terms of time, subjects and participants
- must be curriculum-related, not an "add-on" thing
- purposeful reason for doing project, such as exchanging meaningful data on water quality
- projects should be technically simple "so a teacher doesn't get scared off" and use available resources
- the ages and interests of kids in project should be similar
- there should be manageable number of schools—eight was suggested

As a result of participant feedback and experiences, the structures of computer conferences and projects for use in classrooms have been improved by teachers who used these services in Phase 1. There will be more structured activities, for defined time periods, which can be more easily scheduled into classroom activity.

Other concerns

A number of participants mentioned lack of support from administration, from other teachers, and/or from the District and Ministry.

"One of the important things for frustrations I've had is support—support from the principal, support from the school district, support from other teachers (and it has to be made to feel important to these teachers), support from the Ministry—all of those things."

Others perceived a lack of communication within Districts:

"I hope we can improve communications in the next phase. It's very frustrating when you're out there not knowing whether SITP even exists sometimes in the beginning stages."

Both of these statements indicate that teachers often don't know what is going on within the project. SITP teachers have recommended distributing an increased amount of information both to SITP participants and to others outside the project. This will increase awareness of SITP activities and help to build support for telecommunications use in the schools. It will also help to decrease the sense of isolation felt when only one or two teachers in a school are involved in SITP.

Conclusions

The formative evaluation of the SITP project focussed on the identification of users and usage patterns, the online services used by participants, the ways these online services were used, the types of impacts experienced by participants, and the main obstacles faced by CMC users in this project. Multiple sources of data were collected.

Based on the data collected and analyzed, the following conclusions are drawn, according to the evaluative questions employed for this study.

(1) Who are the SITP participants (teachers, teacher-librarians, staff, principals) and which online services did they use in Phase 1?

The majority of CMC users in the SITP are teachers (56 percent), followed by teacher-librarians (24 percent), principals (12 percent), superintendents (3 percent), and others (5 percent). Approximately 3,000 students were involved in CMC activities. This involvement varied from attendance to one CMC demonstration at the school library or computer lab to weekly participation in online conferences and access to databases. Of students involved, the majority were in grade 8-12, followed by 5-7, and K-4.

A total of 359 IDs were given out by project management. Of these 192 (53 percent) spent more than one hour online between November 28, 1990, and June 30, 1991. Another 56 IDs (16 percent) were online between 15 and 60 minutes during the same period. There were 111 IDs (31 percent) that were online for less than 15 minutes.

The most used online services were electronic mail, followed by computer conferencing, and databases.

While the peak access time is at 3:00 pm, SITP members access the telecommunication system 24 hours a day.

(2) How did participants use computer-mediated communication to support educational activities?

According to questionnaires, interviews, and online messages, the majority of participants are highly positive and enthusiastic about the project, for enhancing teaching and learning activities.

The primary use of CMC was to support peer communication and professional development, and to enhance curriculum-based classroom activities. The use of the services for administrative activities was also indicated by eight participants.

(3) Does CMC impact school settings and participants? If so, how?

This evaluation found that CMC does have an impact on schools and participants. The impact was found to be highly positive. The SITP model was successful and effective: online interaction was maintained throughout Phase 1; the number of participants doubled, and learning activities were supported in a variety of ways.

A number of impacts of CMC usage were identified: on teachers, students, and schools. Teachers stated that the CMC usage increased access to informaton, helped the exchange of ideas with peers, facilitated the connection of their classroom with other classrooms located in

Canada or other places in the world, increased their awareness of new computer technologies, and affected the teacher's role, making him/her more of a facilitator rather than a deliver of information. Reported impact on students (as perceived by teachers) were: greater access to information, increased enthusiam, allowed students to collaborate with a larger group, and brought real-world relevance to work done in the classroom.

Finally, impacts on the school were also reported: an increased awareness of and exchange of ideas with outside world, increased access to information, improvement of teacher development and peer interaction, and fostering of an interdisciplinary approach to learning.

One negative impact was also reported by participants: information overload. Computer-mediated communication increases access to information and the user may have to read dozens of messages on a daily basis. Some of the information accessed, moreover, is not relevant for the user and that acitivity becomes a waste of time. Various participants raised the need for some software tool to facilitate information management to deal with this problem.

(4) What were the main obstacles to using CMC faced by participants during Phase 1?

A number of obstacles to implementing the networked classroom were identified. The main ones were: lack of time, lack of access to hardware, software problems, need for inservice training, and lack of direction on how to integrate use of CMC with the curriculum.

(5) What is required in order to expand the CMC strategies of this project to other regions of the province?

Based on the data collected for this evaluation it was found that the project could be implemented in other regions of the province if the same model is applied. A major issue regarding this expansion relates to the costs involved. There are three major factors involved in increased costs: communication costs, information costs, and inservice training.

The SITP project has shown that computer-mediated communication can be successfully used for teachers' professional development and in the support of curriculum activities in the classroom. A number of obstacles to these usages have been identified as indicated in question 4. These obstacles should be discussed with participants in order to discover strategies for solutions. Lack of time is one. CMC is often perceived as an extra activity, an add-on. Given a clear classroom model and curriculum integration, the issue of time is likely to diminish as CMC coud be viewed as a complementary activity similar to a visit to the library or a classroom project. But even if clear directions are given on curriculum integration, participants require a regular access to computer resources and to support when they face problems in the use of the technology.

With such refinements to the SITP as suggested in this report, the project has significant likelihood of success if applied to other regions of the province. The accumulated experience provided by the implementation of the SITP project is a valuable asset to enrich future educational projects.

Recommendations

(1) Teachers are by now familiar with the technology, its potential and limits. However, they still need more support, particularly with technical problems and training. It is necessary to have a full time person to provide this support, to set up and monitor projects, to ensure they conclude with a final product for each project. Projects should involve a substantial amount of off-line activities.

(2) Emphasize tasks, content, and the curriculum and de-emphasize the technology. Make the technology so transparent that changes in hardware and software will not significantly affect current activities.

(3) Build links to curricular activities and classroom management models to support these new learning environments. The project has a core group of committed teachers, librarians, principals, etc. who are willing to introduce the technology. They should be given more support in their endeavour. Provide personnel who can help design and implement online activities: these may be the moderators or others. Support the design of new learning environments for CMC in schools.

(4) Support suggestions by participating members in concrete ways. For example: contact a person who makes a suggestion, help him/her to give shape to the proposal, and support concrete steps to implement it.

(5) Sponsor face-to-face meetings with moderators, mentors, selected teachers (those who will be initiating projects to discuss these issues in detail).

(6) Recognize active participants. For example, a local ceremony or some other form of recognition for commitment and excellence should be established for this purpose.

(7) Teachers are willing to invest their time in the project but they want benefits from it. Continuity of the project after September 1992 is an important issue for participants. It is important to consider at this stage what will these teachers be able to access once the project finishes.

(8) As the technology becomes more pervasive in education and society at large there is a need for a provincial and national policy on educational electronic networks. This discussion is already taking place in the U.S. and other countries as well.

> As the United States participates in the increasingly global information economy, lack of a coherent and coordinated national communication policy making process is likely to severely hinder the development and execution of a strategy for dealing with the myriad of communication issues that will emerge (1990, U.S. Office of Technology Assessment. *Critical Connections: Communications for the Future).*

British Columbia should take steps in this issue. Discussions should include government and other economic sectors in the process.

(9) Teachers are central to the process of implementation. As the adoption process increases and more computers are used, they will need support in adopting and integrating these new tools into their teaching and professional development activities

Phase 1 of the SITP project showed that the Networked Classroom is a viable option. With careful attention to the conclusions and recommendations contained in this report, this project will be a successful case in the use of telecommunications in the classroom.

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Appendices

I. Overall Goals of SITP

The overall goals of SITP for Phase 1 are:

- To user improved information and telecommunication technologies to assist students and teachers in the teaching-learning process.

- Where opportunities arise in the pilot; to use information technology to assist teacher inservice and training, for educational administration, and to use the technology to service the needs of the local business community.

- To evaluate to what extent these technologies can continue to be used in the participating districts, and to determine if the strategies used in the pilot can be applied elsewhere in the province.

The implementation of these goals takes a considerable amount of resources. The administrative structure of the project is shown below

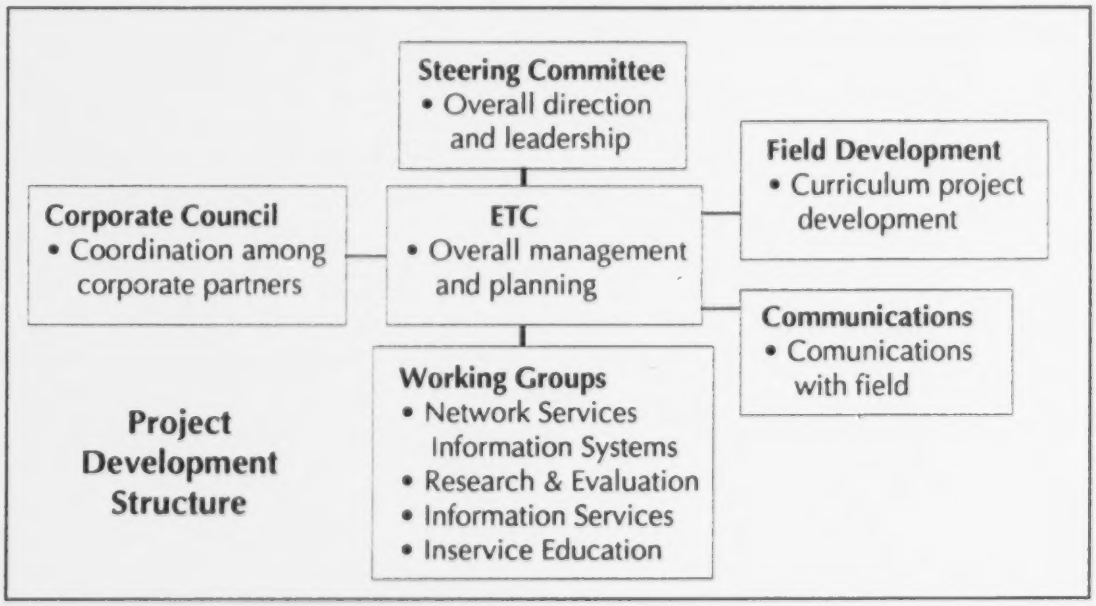
These goals are complementary to those identified in a Ministry of Education feasibility study:

- To improve human communications between the Ministry, the districts, and the schools; and

- To ensure the timely transfer of administrative information.

The educational and administrative activities are currently in different stages of development. The educational activities were initiated in Phase 1 and students and teachers have been online since September 1990. On the other hand, the Ministry is still in the study stage regarding administrative support, having recently completed an initial feasibility study on the administrative needs that could be served by a telecommunications network.

(Taken from "Southern Interior Telecommunications Project - Phase 2 Implementation Plan" - February 1991. Education Technology Centre of British Columbia.)



II. The methodology

The methodology used to investigate adoption of CMC was based on the assumption that users have a variety of experiences and data should be collected from all participants. Extensive feedback from participants and online data collection provided a rich source of detailed and indepth information to address the evaluative questions.

The methodology covers the study of: (1) types of services and their uses, (2) the role of the critical mass of adopters in diffusing the innovation, and (3) types of impact on users and on the school setting. Additional questions address the impact on learning and the feasibility of implementing the SITP model to the rest of the province. Data were collected at different moments of the implementation project and were obtained directly from participants (through questionnaires, e-mail messages, etc.).

Data analysis was conducted to summarize information at very early stages of the project and throughout its implementation. Once these partial findings were systematized, more data were collected. In the last month of Phase 1 and first week of Phase 2 data were also collected, analyzed, and compared with findings of previous data collection. Data were validated through comparison: the same information was collected from different sources or through different instruments.

Several stages of data collection and analysis are part of this methodology:

1. Preliminary and baseline data collection to identify the types of CMC resources being used most regularly, the problems and advantages associated with their use, the users and how often they used the resources, and expected types of impacts on users and schools. This first phase took place between August 1990 to January 1991.

Data collection instruments: two questionnaires, one in August 1990 (questionnaire 1) and the other in January 1991 (questionnaire 2); system generated usage statistics.

2. Monitoring of project implementation and online activity (November 1990 - August 1991).

Data collection instruments: interviews with project management, and analysis of online messages, reports, and conference transcripts, system generated usage statistics, and questionnaires 2 and 3.

3. Identification of types of impacts on users and school setting.

Data collection instruments: questionnaires 2 and 3, focus groups.

4. Triangulation and expansion of findings: video, online data collection (activity reports, messages), and telephone interviews (March - August 1991).

Data triangulation on patterns of participation were also obtained through questionnaires and online data. Another method for data triangulation to verify usage patterns was to compare users' own assessment of online participation with the online data on time spent online.

Baseline data were also collected. These included online users' reports, questionnaires, interviews, system-generated usage data, and conference transcripts. These data provided the information to address the research questions and to make recommendations for improvements in Phase 2 of the project.

Data collection and analysis

Several procedures for data collection and analysis were developed. Data have been stored in databases (Excel, FileMaker Pro, Microsoft Works) and word processing programs (Microsoft Word) for analysis. Transcripts of all the conferences have also been printed for content analysis.

Interviews with key informants, i.e., the project manager, the trainer, and four active participants were conducted in the first months of the project. With the assistance of David Bell and SFU Computing Services an MTS utility file was developed to collect data on usage activities for each ID.

Participants were asked to complete three questionnaires: numbers 1 and 3 were distributed at the Silver Star Resort in August 1990 and August 1991, respectively. Questionnaire 2 was mailed to participants in January 1991.

A two-hour videotape of students working on the computers on various online projects was made for analysis exploring levels and types of participation.

III. SITP Conferences

The SITP conferences covered a variety of curriculum subject areas. Information about these conferences is provided in this Appendix.

English

SITP-Prose was an online writing conference for secondary school students participating in SITP. Students were invited to contribute original works of prose-fiction or non-fiction for comment and discussion by writers, students, and teachers. It was moderated by Crawford Kilian and Trevor Owen. One teacher reported:

"One of the things our students really enjoyed was Crawford Kilian. Not only was it a chance to talk with somebody who was a recognized journalist, but what the kids really liked was that he wasn't a teacher, and wasn't patronizing them —if he didn't like their work he told them ... and they were able to respond back to that and there was some really good dialog between them."

Crawford Kilian wrote a report about his experience in this conference. An excerpt taken from his report is reproduced below (the complete report is attached as Appendix IV):

"My normal practice was to download such material, print it out, make notes on the hard copy, and then prepare a reasonably detailed critique which I would then upload. I tried to provide my responses within a day or two of receiving the students' work, and this was usually manageable given the quantity of material coming in. In a few cases I had responses to my responses, and something like a dialogue began to emerge. For some students this was the really valuable part of the exchange. In most cases, however, my responses seemed to close the discussion—not at all what I had in mind. I was pleased to see revisions of some work, and to respond to them. ... As a general conclusion, I would say that SITP-Prose was a qualified success."

SITP-Write was a writing conference for elementary school students participating in SITP. Like SITP-Prose, students were invited to contribute original works of prose-fiction or non-fiction for comment and discussion by writers, students, and teachers. The conference was moderated by Trevor Owen and Emily Hearn.

	Students	Trevor Owen	Susan Musgrave	TOTAL
No. of Discussions	552	12	3	567
No. of Messages	2077	218	268	2563
No. of Lines	39,929	3967	4508	48,404

From data computer-generated on MTS

Wired.Writers was a nation-wide conference for student writers. It was very active. The conference was moderated by Trevor Owen and Susan Musgrave, who were kept very busy reading and providing feedback to students as the above chart indicates.

Write.With.You was also a nation-wide conference for elementary students. Original works were submitted for comment by students, teachers, and writer in residence, Emily Hearn. The conference was started by Trevor Owen in February 1991. The Writer in Electronic Residence project operates as a partnership between the Faculty of Education at SFU, the Writers' Development Trust, the Ontario Arts Council — Literature Office, participating schools and school districts. See also Appendix VI.

SITP-Writeplan was established by David Porter, for the purpose of planning the agenda for the November 1, 1990, Writing Theme Group meeting in Kelowna. SITP-Writingplan was used to discuss the elementary and secondary writing projects for phase II. It was established by Enid Kristjanson as a follow-up to meetings at the TeleLearning Centre in Kelowna on May 29, 1991. In addition, one discussion concerns publishing students' writing, and one outlines projects such as peer mentors and "Kids Speak Out," a cooperative writing project with the *Penticton Herald.*

Ask-An-Expert

Ask-An-Expert, a conference open to both SITP and non-SITP classes, featured a wide variety of topic discussions. Students or teachers entered questions about a topic and an "expert" in that area would quickly reply. For example, one teacher posted this message:

I am teaching a unit on buoyancy to a Gr. 6/7 class. So far we have compared the buoyancy of objects in salt water and fresh water. Could anyone recommend any other safer, readily available solutions which would make interesting comparisons with fresh water? Is there anything which makes objects in fresh water even less buoyant? Just exactly how does one explain density to kids at this age? Is it fair enough to say that the molecules are packed more tightly? I would like to hear your thoughts and other ideas re:buoyancy that other teachers might have used in class (a teacher).

This teacher received two responses to the question. The first was:

Well, you might try Vodka. It is less buoyant than water, and its buoyancy is the standard measure of its alcohol content.

And a second, lengthier one:

Hi, Peter, may I add to Howard's suggestions. An old chestnut was to take a jar or beaker of methanol (spirit duplicating fluid) and put an ice

cube in it. It sinks! I suppose you could do some interesting things by using a solution of alcohol and water that would change the behaviour of objects very nearly at neutral buoyancy. The other suggestion I would have would be to place an eyedropper that has enough water in it to barely float in a tall bottle. Cover the bottle with some rubber dam or a balloon fragment that leaves a little air space. When you hold the balloon on with an elastic band or some tape you can now push down on the balloon to increase the pressure on the surface of the water and this pressure increase is transmitted through the water to the bit of water in the eyedropper and it pushes upward and compresses the air in the dropper. The dropper is now not buoyant and it sinks to the bottom. As soon as the pressure is released, the dropper returns to the surface. You have made a Cartesian Diver and it may be fond in science how-to books. I have also heard that lemon peel will do the same thing but I have not tried it out. The advantage of using an eyedropper is the students can see what is happening inside the clear body of the dropper tube and then make some suggestions as to what is happening and why things float or sink in water.

This type of specific information and the quick feedback explifies the kind of communication in the Ask-An-Expert conference.

The Ask-An-Expert conference was initiated prior to the SITP project. New conference discussions were added to Ask-An-Expert as the SITP participants joined in. Table 12 shows the titles and activity found in the Ask-An-Expert conference between September 1990 and June 1991. This data represents the activity of both SITP and non-SITP conference participants. Inactive discussions, those not used during 1990-1991, are not included.

Law

In **Law-Forum**, a conference created prior to SITP and open to both SITP and non-SITP classes, lawyers (Legal Beagles) responded to legal questions posed by Law 12 students. One teacher reported: "the practical aspect of it certainly grabs a lot of the kids." The online presence of legal beagles proved to be important both for classroom topics and for real-life concerns. The importance of this resource is illustrated by one teacher's comment:

"We used Law-Forum extensively throughout the school, not just the law class but most other classes as well. A lot of kids have all kinds of legal problems. Some of these problems are quite sensitive. For example there was a student that was being sexually abused by a relative. This student used the e-mail system to message a lawyer in the Leagle Beagle and asked for advice. This kid received all kinds of advice about what to do and how to proceed legally. In this way access to e-mail provided an avenue for this, and other students, who wouldn't talk to a local teacher or to a counsellor or even to social services locally. First this student got a chance to feel what was in store before starting thins off. After obtaining advice from the lawyer this student went and talked to the counselor."

Environmental Studies

SITP-Salmonid was a forum for discussion of salmonid enhancement issues, in-class incubation of salmon, pro-d activities and salmon runs. It was created by an SITP teacher, Kim Fulton. One discussion, "Ask Dr. Fish," was created to allow students and teachers to ask questions to "our experts in the fish world" from the Ministry of Fisheries and Oceans. The conference involved both SITP and non-SITP schools.

SITP-Environet was an umbrella conference for the environmental focus of SITP, created by Milt McClaren. SITP-Enviroissues was a forum for discussion about environmental issues created by Al Smith. SITP-Habitat provided a forum for discussion about Habitat issues in the context of the southern interior created by Linda Dickson. SITP-Habitat_2000 provided a forum for discussion about Habitat_2000 projects in the SITP schools, created by Harry Adam. SITP-Recycling was a forum for discussion about recycling, created by Darrell Brewer. SITP-Mining was a forum for discussion about mining issues, created by Jan Ehlers. SITP-Weather was a forum for discussion about weather issues, created by Rob Marshall. SITP-Water dealt with water resource issues in the Southern Interior Region,

Table 12: Conference Ask-an-Expert: active discussions Sept. 1990 - August 1991

Discussion Number	Discussion Name	No. of Messages *	No. of Lines*
5971	Dr.Spider	70	986
6043	Help with MTS Questions	19	152
8247	Dinosaurs	7	40
8679	Dr. Bones	5	20
10123	Horticultural Happenings	21	146
12554	Winter Holidays	3	18
12653	Owls - Dr. Hoot	34	423
13792	Dr. Bird	32	210
16967	Living Reptiles	11	39
17797	Science Fair Inquiries	6	82
17831	Astronomy	71	1157
18452	Modern Inuit Inquiries	11	73
19061	Trash Incineration	7	47
19742	Spacetalk	36	462
20459 **	Native-ed expert starts conference	54	628
21118	Whales	75	1006
21642	Pulp Mills Environmental Impacts	8	31
21773	BBS's	44	559
21824	Sea urchins	17	119
21876	Questions	10	111
21911	Sharks - questions and answers	9	320
22197	Running Sled Dogs	14	125
22460	Revolting subjects	21	123
22505	Human Physiology	26	200
22624	Water Pollution Laws	1	6
22643	Auto Doc	33	282
22730	PRO - Properties of Light In Mirrors and With Mirrors and Lenses	5	30
22752	Effects of fluorescent lighting on student behavior	15	116
22858	Ocean facts	12	80
22970	Tritium	11	72
23057	Bearman - Questions about Bears	44	655
23185	Software piracy in Japan	5	40
23408	Crickets life cycle and habits	5	19
24002	Russia in the 30's	7	10
24079	CD-ROM	3	16
24157	Archeology and Paolo Soleri	8	116
24488	Ordivician	5	48
25026	Apple basic problems	3	23
	TOTAL	768 messages	8590 lines

* (Sept/90 - August/91)

** Discussion numbers 20459 and greater were started during the 1990-1991 school year. The others were started prior to SITP and continued to be used during the 1990-1991 school year.

From data computer-generated on MTS

including water quality testing, created by Milt McClaren. SITP-Snow was a forum for discussion about snow issues, created by Jay Sherwood. SITP-School_Gardens provided a forum for discussion about school gardens, created by Harry Adam.

Other

SITP-History was a forum for discussion about the history of the Southern Interior region created by Reg Humphries. SITP-Info-Systems was created by David Porter for the Info-Systems theme of SITP. Discussions involved activity reports from the SITP Districts, helpful hints for Dialog and Web, and the promotion of student use of databases and information systems. SITP.ETC was run by SITP management as a forum for sharing general SITP information and evaluation comments.

SITP-Kidsnet featured Internet mail messages from Kidsnet. The messages were sorted into various categories of interest and placed into a series of discussions which makes the incoming messages easier to manage. The conference allowed SITP participants to learn about telecommunications activities in other schools, discover what references and resources are available, and develop contacts with educators with similar interests throughout the world.

IV. SITP approaches to online learning

"A project like a cooperative learning idea really needs telecommunications to work and all the participants have to contribute. It's that obligation that there's a need to participate that's really important in designing online activities that are appropriate for telecommunications and not just contrived to be done and use telecommunications as an add-on. Telecommunications is needed for success." (A Teacher)

Various combinations of online learning approaches were used in the project: Ask-an-Expert, Feedback, Electronic Pen Pals, Group Activities, and access to databases. Each model required online resource persons to support students and teachers' work. The choice of model depended on the activities and on the preferences of the teachers. The models appeared to be most successful when structures and roles were well defined.

The Ask-an-Expert model, used in Law-Forum, involved students sending messages with specific questions to experts on a given area. One teacher noted that this model "works if questions are well considered and supported by observations." The "quick access to difficult information" and "the positive feedback of getting the question answered" were benefits of this model according to teacher participants. One difficulty with this activity was occasional" slow responses from experts ... [because] students lose interest." A librarian reported that "several Ask-An-Expert people have taken over 2 weeks to answer questions and the kids loose interest."

Another SITP model was the **Feedback** model: experts in particular areas provide feedback on submissions made by students. This was used in the writing conferences where the student

These elementary students read a printout from the Dr. Spider conference.

submissions were pieces of original writing and the experts were professional writers. One teacher defined good feedback as "immediate and personal." Teachers mentioned that "students like feedback from 'an author'" and that "when they see their work in print along with comments from Crawford [Kilian] feel great—a great motivator." The "wide variety of material [that] is available to read [allows the students to] see the differences in the maturity of writing and judge their efforts" according to one teacher. The weaknesses of this model's implementation during Phase 1, as mentioned by teachers, were:

(1) *"very few people are actually doing the responding to the pieces of writing unless they are doing outside of the conference,"*

(2) *"we are inexperiences at responding to pieces of writing and therefore the comments are not constructive, i.e., helping the students to improve their writing,"* and

(3) *"it is difficult for individual student responses when we have only one computer on line—we can print and read but inputting takes a lot of time (and supervision still)."*

The **Electronic Pen Pals** model, in which students exchange e-mail messages with counterparts in other regions or countries, was common when classes developed contacts in other places, either through Kidsnet, AT&T Learning Circles, or other sources.

In the **Group Activity** model curriculum-based online activities are designed to be implemented within deadlines for submissions and responses. While there have been many discussions and intentions to implement the Group Activity model for SITP, it did not succeed during Phase 1. The AT&T model, however, uses a Group Activity approach and teachers on that system are satisfied with some of its features. One teacher commented:

"Now that I am involved in AT&T Learning Circles, I find that this is something that is more concrete and I have organized all groups in my class to work on specific aspects of writing projects. I am very excited about the mindworks project. It gave me the structure I needed to become creative with use. I'm afraid the forums as set up have not done so. I think we need some specific direction in these conferences (some of them, not all) that gives direction for teachers. I am aware that this is available all one must do is take the initiative and I have not. I have also found the booklet sent out with the AT&T program to be very helpful."

V. A Report on SITP-Prose by Crawford Kilian

Late in August 1990, I took part in a conference at Silver Star Resort, outside Vernon, which was to bring educators together to launch the Southern Interior Telecommunications Project. My proposed role was to serve as mentor for the writing component of SITP; in the course of the conference I sat down with numerous teachers and other participants to try to define what we might accomplish by teaching writing via computer. We agreed that I would look after secondary-school students only, and that I would not offer advice on poetry. The conference therefore became SITP-Prose. Content would include essays, satire, fiction and so forth. SITP-Prose would offer students an opportunity to present their work to me and others for comment and criticism. My function would be to supplement, not supplant, the classroom teachers who took part.

In an earlier computer conference for student writers, I had uploaded a number of "handouts" on writing. In hindsight this approach seemed to have discouraged some students from contributing, so we agreed that this time such handouts would appear only when they seemed appropriate to a work under discussion.We had no idea how many students would enter SITP-Prose, and the question of overload arose repeatedly during the Silver Star conference. We agreed to see how things went, and to slow down the rate of contributions if they really did become too heavy.

SITP-Prose was soon in business, but the initial flow of student contributions was slow. In many cases, teachers simply did not have the equipment yet, or were not confident in using it. Some teachers wanted to take part but had not attended Silver Star, so they were a bit uncertain about SITP-Prose and how they might best exploit it. As a result, we held a video conference in the fall, with a number of teachers and students in Kelowna and myself in Burnaby at the B.C. Tel Education Centre. This meeting was a constructive and encouraging experience, and helped to clarify matters for some teachers. By providing a "face-to-face" encounter, the meeting also made the whole enterprise a more concrete one. Not long thereafter, student work began to come in. It included short essays, fiction, and even (despite the conference title) some poetry. My normal practice was to download such material, print it out, make notes on the hard copy, and then prepare a reasonably detailed critique which I would then upload. I tried to provide my responses within a day or two of receiving the students' work, and this was usually manageable given the quantity of material coming in. In a few cases I had responses to my responses, and something like a dialogue began to emerge. For some students this was the really valuable part of the exchange. In most cases, however, my response seemed to close the discussion—not at all what I had in mind. I was pleased to see revisions of some work, and to respond to them.

Mentor-teacher dialogue was also somewhat limited. One teacher suggested a discussion in which we could all upload and download additional teaching materials. I recalled the dampening effect of "handouts" on the earlier conference, but contributed a few items. To my disappointment, this discussion did not develop into a forum for "shop talk" among the educators involved in SITP-Prose. I did receive useful e-mail from some teachers, which gave me a fuller understanding of what they were trying to do with particular students or classes, but I would have liked the kind of give-and-take discussion that makes many BBS forums so lively.

As a general conclusion, I would say that SITP-Prose was a qualified success. We did not appear to involve as many students and teachers as we had expected during the Silver Star conference. Those who did take part seemed to gain some

benefit from it, and to enjoy the experience of communicating through a new medium. But I would leave it to the teachers and students to give the final word on that.

For future experiments in this medium, I suggest the following:

1. Face-to-face discussions between teachers and mentors, and between students and mentors if possible. Such meetings, early in the process, would help to make the interaction more personal and immediate. "F2F" meetings aren't vital, but they're certainly useful as I have learned in other distance-education courses I've taught.

2. Complete familiarization with the technology. Anxiety about uploading, downloading and preparing text for transmission can cool anyone's ardor. Once a user has confidence about the process, however, these arcane procedures are no deterrent.

3. "Parallel processing." Mentor and teachers should be in close touch about what's going on and how to maximize the benefits of the mentor's involvement. Whether by e-mail or through a limited-membership discussion group, such contacts would be very helpful. By the same token, students taking part should discuss one another's work as much as possible.

4. Tighter links with curriculum. The mentor should indeed be supplementing the classroom teacher's resources. This would work better if the mentor had a clearer understanding of what the classroom teacher was trying to achieve with a particular student or class, and what the curriculum was demanding. I don't believe anything I said actually clashed with what a teacher was suggesting to students, but the possibility exists that a mentor could undo the teacher's efforts with a single casual remark, or through a basic misunderstanding of the teacher's goals.

5. A "payoff." Perhaps in the form of an anthology of student work, such an end-of-term product would make the whole process more meaningful to students, and would also give teachers and mentors something to evaluate. The anthology might be in print, or an electronic compendium on disk. SITP-Prose was an exciting experience for me as a teacher and as a writer. I'm confident that online teaching has a real future in B.C. education at all levels from elementary to post-secondary. SITP has taught us a great deal; our task now is to build on what we've learned.

VI. Writers In Electronic Residence by Trevor Owen

On a given day last year, it would not have been surprising to see students in SITP schools working directly with established Canadian writers in their classrooms. They, like some 900 students all across Canada, used telecommunications to contact Canadian authors like Susan Musgrave, Katherine Govier, Lorna Crozier, Emily Hearn and others directly from their classrooms in the Writers In Electronic Residence program. The program, which runs from January to June each year, operates as a partnership between SFU and participating schools in the educational community, and the Writers' Development Trust, an organization dedicated to promoting writers and writing in Canada. The Trust has helped to involve the arts community as well.

Taken together, these developments sustained a project that engages SITP students in an animated exchange of original writing and commentary, with the writers and with one another.

And with a national reach.

Crawford Kilian, who served as a writer in electronic residence over two terms, offered some valuable insights in his article. I want to comment on some of these ideas here, but first, I want to let you know what one of the teachers from a Calgary school told me this past summer.

Parent complaints

She said that some of the parents of students involved in the program had complained about the impact the program had on life at home! One parent, a writer herself, said that all this help would allow her son to publish before she could. Another complained that she only got to read Susan Musgrave in her book club, while her daughter was engaged in regular discussions with the B.C. poet from school.

Using telecommunications to promote writing and reading in our classrooms can present problems like this. I'd like to offer some thoughts on how we might deal with them by reviewing our experience last year, some of Crawford's ideas, and building on what (we think) we're learning.

How & why SITP got involved

"When I was in school, I thought that every writer was English and dead. It never occurred to me that you could be a poet and be Canadian at the same time. Things worth writing about happened some place else, to other people. My own experience as a student was one of the reasons I accepted the position of Writer In Electronic Residence a year ago. The program is one way of putting a writer in every English classroom so that kids can see that books don't fall from the skies untouched by human hands. Rather, they are created by ordinary people not unlike them, their neighbours, teachers or parents. Books come out of a specific time and place. Who you are and where you come from are the stuff that books are made of." – Lorna Crozier, Poet, Saskatoon, Saskatchewan/Writer In Residence at University of Victoria

The first purpose of the Writers In Electronic Residence program is to use telecommunications technology to promote student writing by linking English and Language Arts classrooms with published writers (and other classrooms) across Canada. We think that students have a voice that needs to be heard and developed, and that doing so stimulates oral and written language. Since the program began in 1987/88, students from Baffin Island to Williams Lake, Halifax to Vancouver have been doing just that—letting their voices be heard, and seeking out the language they need to respond.

Initially, we focused on using technology to promote the process of reading and writing to learn in the classroom for two reasons:

[a] The nature of on-line interaction is textual and, therefore, appropriate to writing and commentary; and,

[b] The on-line forum provides a certain equity of use, placing students in control of the media before them to broaden the shape and scope of the classroom experience.

After the second year, we found that our experiences were providing valuable information. Operating under the auspices of a teacher research grant awarded by the Canadian Teachers' Federation and Hilroy Foundation, we considered the impact of this program on literacy. What we found led us to include two additional notions:

[c] The interaction that is fostered online promotes considered response, both online and in the classroom, engaging participants in an essentially reflective activity that fosters the acquisition and use of language for reading and writing.

[d] Original student writing is validated as legitimate reading material.

And all the while, we have been learning that there is a second purpose to the Writers In Electronic Residence program—to bring together communities of interest in Canada, whether in education, literacy, or the arts, in an effort to promote writing (and reading) in our schools. Along with all those students and teachers there are writers who have been learning about the value of our students' work. So far, there have been eleven writers involved, and several of them, like Crawford, have stayed for an additional term!

What we have learned: How it works—and why

We know now from our work that these links offer meaningful opportunities for language development and proficiency. Students control their own experiences in an atmosphere where tolerance is promoted as a natural result of seeing the world as another might. But we know, too, that a need exists to interpret experience within a meaningful context. A clear example emerged almost immediately in our first project when students in Toronto began receiving poems from students in Burnaby. The themes present in the students' poems were quite similar in many cases, but the images that supported them clearly revealed that (and how) a sense of place and region was inherent in the work—their own and others. Images of urban traffic congestion in one setting gave way to mountains and oceans in another, and the students began to discuss—as a group, within the context of their own classroom—how to respond to the new experience.

As the program has grown, we have seen this develop. Consider, for instance, how images of water and boats might reflect life in Pond Inlet, NWT, and then how these images might differ in the writing offered by students who fled to Canada from Saigon.

Local shape: *working in the classroom!*

These images are compelling. And the impact on our students is compelling too, especially when the experience is incorporated into a familiar environment, like a classroom. As students interpret these online experiences they often call upon themselves and one another to consider, reflect upon, and then express how "who we are" reveals "how we are where we are." The students' abilities to summon language appropriate to their desire to respond and interact demonstrate a sincere wish to be understood as well as to understand. We have also seen how this language-based use of technology offers an oral possibility in addition to a written one, in the classroom, right where it belongs.

Distance is a resource

It should be said right off the top that this is worth doing. The student writing is remarkable. It reveals how, in the telecommunicated world, distance can and should be seen as a resource much more than something that can be "overcome." Consider again, for example, the writing of Inuit students from Baffin Island that I noted, above. Notions of survival are revealed as naturally as they are distinct from those expressed by students who identified themselves as Canadian-born Chinese in Ontario. And Vietnamese students who wrote about war, about the boats, and about escape and betrayal, also searched for ways to express fond memories of family and home, the value of trust, and the details of life as they lived it in Hanoi. Still others considered issues of equity and gender, race, and freedom of expression.

However different the students may be from one another, all were exposed to a shared sensitivity. They searched deeply. And they controlled their own participation in an atmosphere of co-operation and trust. In the Writers In Electronic Residence program, we view the telecommunicated experience as a means by which language is experienced, and we believe that many meaningful opportunities to summon language flow naturally from these links, both online and as a result of having been online.

Key ideas

Our students may now reach out electronically into the world from their desks and bring what they find there back into the classroom. They can do this to meet existing curricular goals too. But more often than not, we are seeing that new, more active components to learning with the curriculum we have are beginning to emerge.

We think that the SITP experience demonstrates some important ideas that we can learn from.

First, the projects emphasize task, not technology, and they are language-based, involving participants in actively summoning language appropriate to the tasks at hand, and particular language in particular situations. Accordingly, they seek to engage learners by offering direct and personal access to activities that are relevant now. And they promote equity, validating our students' voices, encouraging what we have been calling "network citizenship" in SITP.

Things to consider

Crawford noted that there were just a few cases in which students responded to the commentary he had provided in SITP-Prose last fall. "For some students," he wrote, "this was the really valuable part of the exchange. In most cases, however, my response seemed to close the discussion-not at all what I had in mind."

In the Writers In Electronic Residence program, our greatest success in fostering student response and interaction has come when we have emphasized that we are not asking students to serve as "critics," that we are not setting out to teach criticism, and that we are not going to evaluate their abilities to produce it.

Rather, we invite them to write, to read, and to enter into textual discussions with a "safe" audience. One that is interested in writing. And one comprising professionals and peers. Here are some ideas we're developing now to help promote the interaction we seek:

1. Give & get

One of the elements that we think contributes to this success is the idea that students "give and get" in the program. In fact, it was successful enough to prompt us to ask our students to comment on at least one student work for each piece they posted themselves.

The impact of the "writer-as-moderator" is very important here. While the writer's role as "expert" is also important, we think our experience demonstrates that it needs to be, and seen to be, responsive.

2. Student closure

To help this idea work, we thought it would be a good idea to ask each student to "close" any discussions they "open" when they post their writing in the conference. It might be with a revision, or discussion within a series of revisions, or some closing comments about the experience.

But in any case, the student can know that s/he will have the last word.

3. Audio conferences & readings

In his article, Crawford suggested that "face-to-face" discussions between the various groups represented online might make "interaction more personal and immediate." At this year's SITP retreat in Vernon, audio conferencing was offered as a means of supporting the online interactions between people. I think audio conferencing serves as an excellent alternative to "face-to-face" meetings. They are more easily facilitated, and they have the advantage of retaining a certain focus on the writing students have done. In my own experience, I can say that students seemed to genuinely appreciate the opportunity to read another's work aloud, or to hear their own piece read by someone in another setting.

Over the past four years we have seen some fairly clear patterns emerge in the ways that classrooms respond to the introduction of technology. They see increased student control over their own writing and, perhaps not surprisingly, an increased emphasis on the use of student writing in the context of the curriculum.

While access to, and experience with, the technology is clearly an issue to dealt with, it seems pretty clear that incorporating the program into the existing classroom program is the best place to start for many teachers and students. It provides a direct payoff where it counts, in the classroom, where the work has relevance.

Sandra Hawkins, who is known to many SITP teachers through her involvement in the Law projects, wrote about this from her perspective as a teacher using WIRED.WRITERS in the classroom: "Suddenly, teachers get credibility after years and years of useless circling errors in insulting red. I have some of my best discussions with students online. Their comments surprise me and they seem to feel the same about some of the comments I make."

Students feel the same way, it seems. One of Sandra's students said she felt "qualified to comment on the work in WIRED.WRITERS," which she saw as different from classes in which the teacher held the expertise, or most of it, alone. A student comment from an Ontario school that "it was an odd pleasure to be taken so seriously" seems to echo this view.

Student theft

In this writing program, I think we can foster the kind of interaction we seek by validating our students' own work as reading material that is welcome in our classrooms. But I think I should warn you, it can get out of control. In one of the Toronto schools, a teacher reported how the level of involvement in her classroom reached such a fevered pitch that her students began to steal the printouts she kept for them!

I guess some people get all the problems.

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